CLEAN DEVELOPMENT MECHANISM
FORM FOR SUBMISSION OF BUNDLED SMALL SCALE PROJECT ACTIVITIES
(SSC-CDM-BUNDLE)

SECTION A. General description of the Bundle

A.1. Title of the Bundle:

Title: Improving Kiln Efficiency in the Brick Making Industry in Bangladesh

A.2. Version and Date :

Version: 01
Date: 15/04/2011

A.3. Description of the Bundle and the subbundles:

The purpose of the project is to construct 8 new energy efficient kilns to reduce emissions of CO_2 in Bangladesh. At present, brick making is a highly energy-intensive activity and is one of the largest sources of greenhouse gas emissions in the country, estimated to be in the order of 3.0 million tonnes per annum (ref. UNDP Project Document, titled "Bangladesh - Improving Kiln Efficiency in the Brick Making Sector", August 2006)[1]. By employing the technology embodied in the Hybrid Hoffman Kiln (HHK), the project will pilot the introduction of modern and sustainable brick making technology to Bangladesh.

The HHK is a hybrid version of the Hoffman Kiln technology that was developed in Germany in the mid-nineteenth century. Since then, it has been redesigned to improve heat retention in the kilns and to capture waste heat for recirculation in the drying tunnel. In addition, coal consumption is reduced by introducing pulverized coal into the wet clay in each brick which then bakes the brick from the inside.

The designed production capacity of a Hybrid Hoffman Kiln may vary from minimum 50,000 bricks per day to several multiples of 50,000 bricks per day. Though each kiln by itself would qualify as a Clean Development Mechanism (CDM) project, the project proposes bundling 8 HHKs, the aggregate daily production capacity of which is 500,000 bricks per day, into one Project Design Document (PDD) to reduce CDM transaction costs whilst remaining within the small scale threshold for this type of activity.

The brick kilns (subbundles) participating in this project are listed in Table 1, below:

[1] Available at http://gefonline.org/projectDetailsSQL.cfm?projID=1901

Table 1: Participating HHKs (Subbundles)

Kiln name	Brick production per day
Universal Bricks Ltd.	50,000
Haair Bricks Ltd - Dhamrai	50,000
Diamond Auto Bricks Ltd.	100,000
SSL Ceramic Bricks Ltd. (Kiln 1)	50,000
SSL Ceramic Bricks Ltd. (Kiln 2)	50,000
Kapita Auto Bricks Ltd.	100,000
Banalata Refractory Ltd.	50,000
Sunflower Bricks and Construction Materials Ltd.	50,000

Project Activity	Type	Category	Technology/Measure
Introduction of energy efficient Hybrid Hoffman brick kilns in Bangladesh.	Type II – Energy Efficiency Improvement Projects	II.D – Energy Efficiency and Fuel Switching Measures for Industrial Facilities	Energy efficient coal fired brick kilns with production capacity of 50,000 to 100,000 bricks per day

The Industrial & Infrastructure Development Finance Company Ltd (IIDFC) which is a Bangladesh financial institution will be the bundling agent for the 7 kiln owners of the 8 kilns. As the technology is new to Bangladesh, technology services are largely imported from China by the brick kiln owners.

IIDFC has signed contractual agreements with the HHK entrepreneurs to transfer the ownership of the emission reductions from each HHK owner to IIDFC. IIDFC will retain a portion of the CER revenues to administer project activities, the remainder in some cases being escrowed as a risk mitigating instrument for HHK debt finance. The contractual agreements also spell out the environmental and social performance obligations of the entrepreneurs.

In order to reduce the transaction cost, a bundling approach is being followed in compliance with the rules prescribed by the Executive Board for bundling small scale projects.

A.4. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Bangladesh (host)	Industrial and Infrastructure Development Finance Company Ltd (IIDFC) (Private entity)	No
Denmark	International Bank for Reconstruction and Development (IBRD) as Trustee of the Danish Carbon Fund (DCF)	Yes
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

SECTION B. Technical description of the Bundle:

B.1. Location of the Bundle:

B.1.1. Host Party(ies):

Bangladesh

B.1.2. Region/State/Province etc.:

Dhaka Division (7 units), Rajshahi Division (1 units)

B.1.3. City/Town/Community etc:

Dhamrai, Gazipur, Narayanganj and Natore

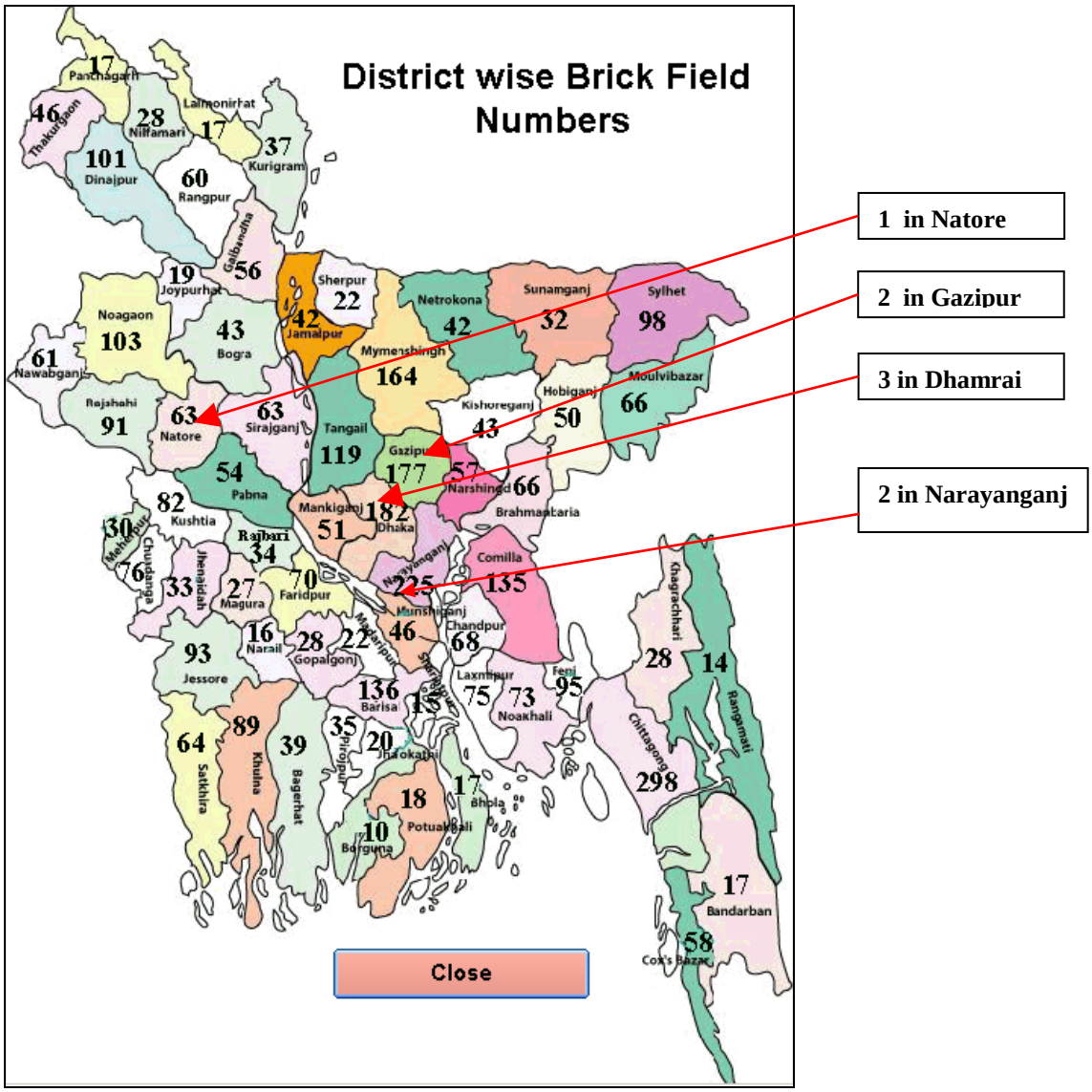
B.1.4. Details of physical location, including information allowing the unique identification of this Bundle:

The plant locations of the 8 new HHK units in seven individual commercial enterprises have been finalised and are in different stages of production/construction: Dhamrai (3 kilns), Gazipur (2 kilns) and Narayanganj (2 kilns) and Natore (1 kiln). Locations of the 8 HHK facilities are shown in the table below and on Figure 2, indicating the distribution of brick making enterprises in Bangladesh.

Name of Entrepreneur		Location of HHK Facility		
	Daily brick production	Area	Latitude	Longitude
Universal Bricks Ltd.	50,000	Dhamrai,	+23.5852	+90.1128

		Dhaka Division		
Haair Bricks Ltd.(Dhamrai)	50,000	Dhamrai, Dhaka Division	+23.5852	+90.1128
Diamond Auto Bricks Ltd.	100,000	Narayangonj, Dhaka Division	+23.4800	+90.3437
SSL Ceramic Bricks (Kiln 1)	50,000	Gazipur, Dhaka Division	+24.1051	+90.2319
SSL Ceramic Bricks (Kiln 2)	50,000	Gazipur Dhaka Division	+24.1051	+90.2319
Kapita Auto Bricks	100,000	Dhamrai, Dhaka Division	+23.5248	+90. 0138
Banalata Refractory Ltd.	50,000	Natore, Rajshai Division	+23.5611	+90.1450
Sunflower Bricks & Construction Materials Ltd.	50,000	Narayanganj Dhaka Division	+23.4800	+90.3470

Figure 1: Map Showing Location of Project Kilns and the Distribution of Brick Making Activities Throughout Bangladesh



B.2. Type(s), category(ies) and technology/(ies)/Measure/(s) of the bundle:

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According to Appendix B to the *Simplified Modalities and Procedures for Small-scale CDM Project Activities*, the proposed project activity falls under the following type and category:

Project Type : Type II – Energy Efficiency Improvement Projects
Category : II.D – Energy Efficiency and Fuel Switching Measures for Industrial Facilities
Reference : AMS-II.D./Version 12.0, Sectoral Scope: 4

This methodology is most applicable as it covers "efficiency measures for specific industrial processes" that "may replace existing facilities" or be installed in a new facility. The project deals only with energy efficiency measures, not fuel switching, for industrial facilities.

Description of Technology/Measure[2]:

Structurally, the HHK is like the Hoffman Kiln but, unlike the few traditional Hoffman's in Bangladesh, the fuel used is coal. The kiln can be made from firebricks or from green bricks i.e. unbaked bricks. In the latter event, the green bricks get "baked" during kiln operations. The inner kiln lining is made from standard bricks, set in arched chambers, to improve air flow and therefore better combustion. The firing chamber can be filled manually or automatically with green bricks; usually about 7,000 to 8,000 bricks at a time, in line stacks of around 1,500. Thus, there are five to six line stacks. The firing time for each line stack is about half an hour. Air-flow through the firing chamber is induced by a large vacuum pump that pumps the hot air from the firing chamber into the separate drying tunnels.

Granulated coal, is fed manually into the firing zone in the kiln through stoke holes in the roof of the kiln. Air required for the combustion process is forced from behind. As it reaches the line to be fired, it is already preheated from the previous firing zone thus reducing firing time and energy usage. The temperature in the firing zone is about 950˚ C. The process is extremely simple and is carried out mostly manually.

The mixing of pulverized coal with clay to form the green bricks further improves thermal bonding and reduces fuel usage, and hence CO_2 and other emissions. Almost 80% of the total energy required to bake a brick is thus inside of the brick and only about 20% is fed externally into the firing chamber of the kiln. Almost all the fuel inside of the brick is burnt during firing.

One single sized HHK has a design capacity of 15 million bricks per year. The bricks are 25% larger than the sizes commonly produced in Bangladesh. The average weight of an HHK brick is 3.5 Kg where as average weight of an FCK brick is 2.9 Kg.[3] Compared to this, the traditional tall fixed chimney kiln (FCK) which constitutes about 80% of the industry each produce about 2 million bricks per annum over a five to six month production period (these kilns being shut down during the annual monsoons). This means that the production capacity of each HHK is about 7.5 times that of the older Energy Inefficient Kilns (EIKs). Even with the larger brick size, the coal consumption per HHK is about 13 tons per 100,000 bricks. This is equivalent to 0.037 kg coal consumption per kg HHK brick production. This compares extremely favorably to the 24 tons coal consumption per 100,000 FCK bricks or 0.082 kg coal consumed per kg FCK brick production. The new kilns are, therefore, about 55 % more energy efficient than the FCK's[4]. This comparatively low energy usage in the HHK will result in reduced CO_2 emissions of approximately 55,830 tonnes per annum, for all 8 kilns.

A kiln consisting of 18-22 doors will have production capacity of 50,000 bricks per day and will be considered as single sized HHK. A kiln consisting of 36-44 doors will have production capacity of 100,000 bricks per day and will be considered as double sized HHK.

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[2] See UNDP Project Document, titled "Bangladesh - Improving Kiln Efficiency in the Brick Making Sector", August 2006)[2], pg 68, describes the technology.

[3] IIDFC report titled " Weight of Bricks in Bangladesh, 2009"

[4] Refer to report titled: Clean Development Mechanism Project Opportunities in Bangladesh, Pre Feasibility Report on a Brick Manufacturing Fuel Substitution CDM Project, Bangladesh University of Engineering, December 2002, Table A, pg 3, which list fuel use per kiln type: http://pubs.pembina.org/reports/cdm_bangladesh_brickkilns.pdf

The Production Process

Clay Extraction, Transport and Preparation - The clay is excavated by hydraulic excavator or by hand from a nearby area and transported to the plant-stacking yard by trucks. The clay is then crushed by means of roller mills, followed by a double-shaft mixer, where water is added to ensure 15% moisture content.

Introduce pulverized coal and shape the brick - Pulverized coal is mixed with the clay which is fed into a vacuum extruder. A column of clay is pushed out/extruded. This is then cut into the green bricks which are then manually loaded onto a drying car for drying.

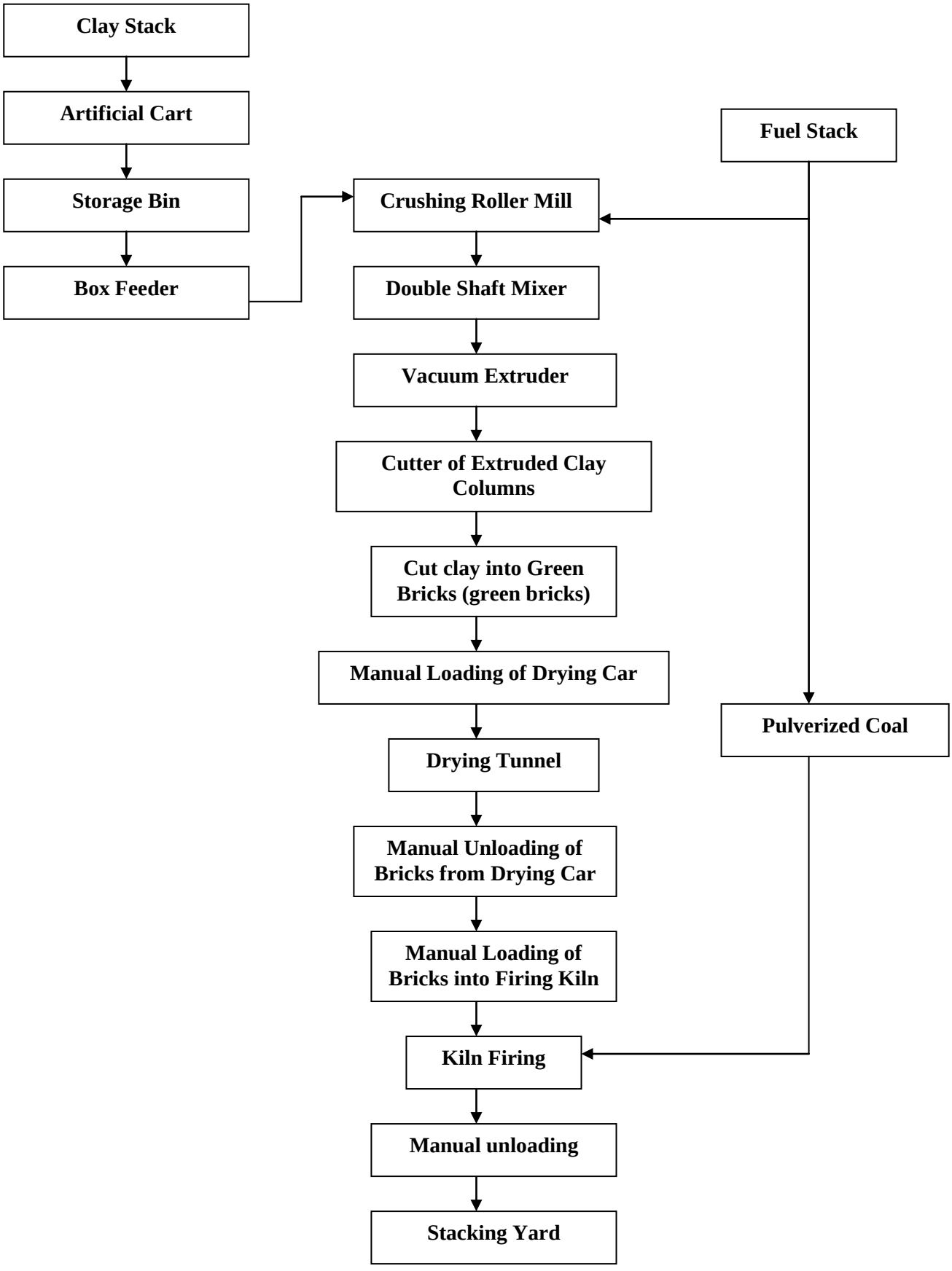
Brick Drying - The drying car is then moved into the drying tunnel. The drying cycle lasts for about 26 hours. The hot air in the drying tunnel is sucked in from the annular kiln.

Brick Firing - The dried green bricks are then removed from the drying tunnel and loaded manually into the annular HHK kiln. The speed of the firing is 1.25m/h at a sintering temperature of about 950^{o}C - 1050^{o}C. The fired bricks are unloaded and conveyed manually in carts to the stacking yard.

Main technical data includes:

Clay particle size after roll mill:	< 2mm
Brick moisture content for shaping:	18% - 20%
Dry chamber temperature	120 ^{o} C
Sintering temperature:	950 ^{o}C -1050 ^{o}C

Figure 2: Schematic diagram for the HHK brick making process



B.3 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2e
Year 1 (1 September 2011 - 31 August 2012)	44,656
Year 2 (1 September 2012 - 31 August 2013)	55,820
Year 3 (1 September 2013 - 31 August 2014)	55,820
Year 4 (1 September 2014 - 31 August 2015)	55,820
Year 5 (1 September 2015 - 31 August 2016)	55,820
Year 6 (1 September 2016 - 31 August 2017)	55,820
Year 7 (1 September 2017 - 31 August 2018)	55,820
Year 8 (1 September 2018 - 31 August 2019)	55,820
Year 9 (1 September 2019 - 31 August 2020)	55,820
Year 10 (1 September 2020 - 31 August 2021)	55,820
Total estimated reductions tCO_2e	**547,036**
Total number of crediting years	10
Annual average over the crediting period tCO_2e	54,704

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the Bundle

10 years[5]

C.1.1. Starting date of the Bundle:

20/11/2006. It is the project start date of first HHK (Universal) as evidenced by Sub Contract issued.

C.2. Choice of crediting period and related information:

C.2.1. Renewable crediting period:

Not applicable

C.2.1.1. Starting date of the first crediting period:

Not applicable

B.2.1.2. Length of the first crediting period:

Not applicable

[5] Conservatively. Most facilities in Bangladesh and LDCs are maintained beyond their projected operational lifetime.

C.2.2. Fixed crediting period:

Yes

C.2.2.1. Starting date:

01/09/2011 or not before project registration

C.2.2.2. Length:

10 years 0 month

SECTION D. Application of a monitoring methodology:

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The project activity uses the monitoring methodology AMS-II.D. – Energy Efficiency and Fuel Switching Measures for Industrial Facilities, Version 12, EB 51.

This section is accordance of monitoring requirements of AMS-II.D. and details the steps taken to monitor on a regular basis the GHG emissions reductions from this project.

The main components within the monitoring plan are:

1. Parameter to be monitored, and data collection procedures.
2. Management and Operational System/procedures
3. Quality assurance measures and responsibilities including data base management

If necessary, this Monitoring Plan can be updated and adjusted to meet operational requirements, provided that such modifications are approved by a Designated Operational Entity during the process of verification. The Senior Project Associate, IIDFC, will be responsible for the activities related to implementation of the procedures.

1. Parameter to be monitored and data collection procedures

The approved methodology AMS-II.D. (Version 12: EB 51): Energy efficiency and fuel switching measures for industrial facilities, requires metering of the energy use of the equipment installed.

In the case of the project, the use of electricity and or gas to operate plant equipment will easily be metered. As HHKs mainly consume thermal energy for brick making, the project proposes measuring this energy use through monitoring the quantity and type of fuel used (coal) along with their calorific values. The calorific values will be monitored with each new consignment of coal which will be centrally purchased. The additional parameter that needs to be monitored to enable the estimation of energy savings is the output of the plants in terms of the number of bricks produced.

Continuously all the data to be monitored will be registered in the plant register either in electronic form or on paper worksheets or both. Data collected will be entered in electronic worksheets and stored.

Emission reductions calculations will be carried out by a competent manager using a MS Excel spread sheets. Backup of the data electronically will be conducted on a weekly basis, and hard copy data will be printed monthly and a Performance Report will be prepared quarterly.

All data will be kept for the full crediting period, plus two years.

Parameters to be monitored, and how data will be collected are described below.

Data / Parameter:	$TC_{Coal\ i,y}$
Data unit:	Tonnes/year
Description:	Total consumption of coal for brick making in brick plant i in year y
Source of data to be used:	Invoices from the Coal suppliers
Value of data	1,950 (estimated value for ex-ante calculation. Actual value will be monitored)
Description of measurement methods and procedures to be applied:	Total Purchase will indicate the amount of coal supplied and consumed in brick production. These invoices will be gathered in the project office. Data will be included in the monthly report. At the end of each year total consumption will be calculated.
QA/QC procedures to be applied:	Coal stock at the end of each verification period will be estimated and noted in the annual report and the coal stock register will be used to cross check brick production and raw material purchase.
Any comment:	The data will be archived for up to two years after the end of the crediting period.

Data / Parameter:	$NCV_{Coal\ i,y}$
Data unit:	TJ/Kg
Description:	Net Calorific Value of coal used in y^{th} year in brick plant i
Source of data to be used:	As per the data provided by the supplier and independently verified by a credible Bangladesh laboratory. (Ex-ante value is from: www.bcmcl.org.bd)
Value of data	2.57×10^{-5} (or 6,135 Kcal/Kg. Value used for ex-ante calculation)
Description of measurement methods and procedures to be applied:	A composite sample of 1 kg coal will be taken from each new consignment of coal. At the end of each quarter all the samples taken in that quarter will be crashed and mingled to produce a representative sample for that quarter and will be laboratory tested to determine the net calorific value of coal used for that particular quarter and the value will be reported in the quarterly report. The entire data will be monitored and will be archived on paper and electronically. Average of the Net calorific values of different quarters will be calculated at the end of each verification/crediting period and will be considered as the net calorific value of coal used by related brick company in that crediting period.
QA/QC procedures to be applied:	The bundling agent will cross check the coal consumption data by inspecting the coal stock register and reports of calorific value tests at the end of each verification/ crediting period.
Any comment:	The data will be archived for up to two years after the end of the crediting period.

Data / Parameter:	$DP_{Bricks, i}$
Data unit:	Bricks/Day
Description:	Daily production of bricks in Kiln i
Source of data to be used:	On-site measurements by the kiln owner
Value of data	50,000 - estimated value for single sized kiln 100,000 – estimated value for double sized kiln)
Description of measurement methods and procedures to be applied:	The daily production (units of bricks manufactured) will be noted in a log sheet which will be maintained in the project plant. Measurements will be noted by technicians in the plant in the log sheets every day. Supervisor will sign the log sheet at the end of each day and data will be provided to the CDM Monitoring and Compliance officer, who will maintain data gathered in the project office. Monthly Reports will be prepared periodically by the CDM Monitoring and Compliance officer and will be gathered in electronic and paper mode.
QA/QC procedures to be applied:	The amount of bricks manufactured at the end of each crediting period will be cross checked with the invoices for the sale of bricks and the stock in the plant.
Any comment:	The Total Production of bricks per year in plant i is calculated by adding up the daily production of operating days in the year. The data will be archived for up to two years after the end of the crediting period.

Data / Parameter:	$DMW_{HHK Bricks, di,,}$
Data unit:	Kg
Description:	Daily Mean Weight of baked HHK bricks in kiln i
Source of data to be used:	On-site weighing by the kiln owner
Value of data	3.5 – estimated value for ex-ante calculation. Actual value will be determined as described below.
Description of measurement methods and procedures to be applied:	The average weight of bricks will be calculated as per the General Guidelines for Sampling and Surveys for Small Scale CDM Project Activities (EB50, Annex 3) using Load cell /Weighing scale. At each production day, a sample size of 100 bricks will be taken as per the sampling plan described in Annex 4 and will be weighed separately and mean daily weight will be calculated.
QA/QC procedures to be applied:	Calibration of load cell/ weighing scale every year. The calibration will be carried out by government accredited laboratory
Any comment:	The data will be archived for two years after the end of the crediting period.

Data / Parameter:	$SEC_{i, y}$
Data unit:	TJ/Kg-brick
Description:	Specific Energy Consumption in brick field i

Source of data to be used:	Calculation result using equation (3)
Value of data	9.54×10^{-7} (estimated value for ex-ante calculation)
Description of measurement methods and procedures to be applied:	The specific fuel consumption per brick will be calculated once a year based on the data for coal consumed and bricks produced during the corresponding period.
QA/QC procedures to be applied:	The data can be cross checked by comparing it with the quantity of bricks sold and coal purchased based on the sale/purchase receipts.
Any comment:	The data will be archived for up to two years at the end of the crediting period.

Data / Parameter:	N
Data unit:	days
Description:	Number of operational days of the kiln in a year
Source of data to be used:	Recorded by the kiln owner
Value of data	300 – estimated number of days for ex-ante calculation
Description of measurement methods and procedures to be applied:	The kiln owner will keep a record of the number of operational days of the kiln during the year.
QA/QC procedures to be applied:	The kiln owner will record the data.
Any comment:	The data will be archived for up to two years after the end of crediting period.

Data / Parameter:	$FC_{Diesel, j, y}$
Data unit:	Kilolitre /yr
Description:	Quantity of diesel (fuel type) combusted in process *j* during the year *y*
Source of data to be used:	Invoices from the suppliers
Value of data:	21 (for ex-ante estimate based on experience of the Universal Bricks Ltd and Diamond Auto Brick field Ltd)
Description of measurement methods and procedures to be applied:	Purchase will indicate the amount of diesel supplied. The entire purchase in a year will be considered consumed in brick production. These invoices will be gathered in the project office. Data will be included in the monthly report. At the end of each year total consumption will be calculated.
QA/QC procedures to be applied:	The diesel stock at the end of each verification period will be estimated and noted in the annual report and the diesel stock register will be used to cross check brick production and raw material purchase.
Any comment:	Continuous monitoring will be required. Diesel consumption will be used to calculate CO2 emissions from fossil fuel combustion in process j during the year y, (tCO2/year) in HHK plant i where j stands for the process required for the operation of the HHK plant. Latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion.

Data / Parameter:	$EC_{i,y}$
Data unit:	MWh
Description:	Electricity Consumption in plant i per year
Source of data to be used:	Electricity bill from the REB or the electricity supplier
Value of data:	270 (for ex-ante estimate based on experience of the Universal Bricks Ltd and Diamond Auto Brick field Ltd)
Description of measurement methods and procedures to be applied:	Monthly Electricity bill paid to Rural Electricity Board (REB) will be used to calculate the total electricity consumption of the month and will be noted in the monthly report
QA/QC procedures to be applied:	This will be cross checked with the monthly noted meter reading.
Any comment:	Electricity consumption will be used to calculate grid CO2 emissions during year y in HHK plant i due to the project operation.

2. Management and Operational System

The data relevant to the project are proposed to be monitored and recorded manually by the plant operators.

The plant owners (entrepreneurs) will monitor the data for their respective plants based on, daily brick production and weight of the bricks. This data will be recorded daily in the plant registers and once a month this will be compiled and delivered to IIDFC.

The coal supply of each consignment will be evidenced by suppliers invoice. The total coal consumption will be calculated by summing up the values stated in the Invoices. A composite sample of 1 kg coal will be taken from each new consignment of coal. At the end of each quarter all the samples taken in that quarter will be crashed and mingled to produce a representative sample for that quarter and will be laboratory tested at the BRTC, Bangladesh University of Engineering & Technology (BUET) to determine the net calorific value of coal used for that particular quarter and the value will be reported in the quarterly report. The entire data will be monitored and will be archived on paper and electronically. Average of the Net calorific values of different quarters will be calculated at the end of each verification/crediting period and will be considered as the net calorific value of coal used by related brick company in that crediting period. The above data will be submitted to IIDFC for checking and for archiving purposes.

Each plant owner will employ a competent person in his plant as CDM Monitoring and Compliance Officer whose responsibility will be to collect the monitoring data as described in Section B.7.1 from different departments/sections of the plant and compile the data in the Excel format provided to them by IIDFC, the bundling agent. The CDM Monitoring and Compliance Officer will also be responsible for monthly delivery of both hard copies and electronic version of the Monitoring Data. Monitoring Officer of IIDFC will collect data from each subproject on a monthly basis and submit these reports to the Senior Project Associate / Senior Officer to produce quarterly performance reports and annual Emission Reports.

The monitoring operation will be conducted according to the following Table

Task and Area of Responsibility	Method Used	Frequency	Responsible person	Contact details
Operation of the monitoring equipment	Manual entry, data recording Electronic Recording	Daily Continuously	Operator in-charge Operator in-charge	Respective plant owner
Quality control of information	On a monthly basis monitoring reports will be checked On monthly basis these reports will be forwarded to Senior Project Associate	Data review monthly	Monitoring Officer Senior Project Associate	IIDFC IIDFC
Data collection	Collection of Monitoring data from each Subproject in both hard copies and electronic workbook format provided to each subproject by IIDFC	Monthly	Monitoring Officer	IIDFC
Calculation of the emission reductions and any deviations from projections	As per PDD/ monitoring plan with excel spreadsheets	Quarterly	Senior Project Associate/Senior Officer	IIDFC
Storage of the data (measured calculated, estimated data)	Data collection from subprojects and storage	Monthly Periodic Monitoring Reports	Monitoring Officer	IIDFC
QA/QC	As per the OMP Weighing equipment (depends on type of scale)	Yearly Yearly	Senior Project Associate/Senior Officer Operator in Charge	IIDFC Respective Brick Company
Kiln owner's staff training (CDM monitoring)	Training program as and when required	As and when required	IIDFC or their Consultants	IIDFC
Signs off on monitoring reports and achieved ERs		Yearly	Project in Charge	IIDFC

3. Quality assurance measures and responsibilities including data base management

Senior Project Associate/ Senior Officer, IIDFC will be in charge of, and accountable for, the generation of the ERs, including monitoring, record keeping, computation of ERs, audits and verification. The Project in Charge, IIDFC will ultimately be responsible for ensuring that the monitoring system is established and implemented to the satisfaction of a DOE and the IBRD acting as trustee of Carbon Funds.

IIDFC may conduct onsite training and quality control programs as and when required to ensure that good management practices are ensured and implemented by all project operating personnel in terms of recordkeeping, equipment calibration, overall maintenance, and procedures for corrective action.

The following quality control measures will be adopted to increase the reliability of the data monitored:

- To improve the reliability of data recorded by the plant operators, IIDFC or their consultants will carry out an audit of the plants on an annual basis. The audit will be carried out at least for three consecutive days, and IIDFC nominated auditors (designated as Carbon Inspectors) will verify the data on brick production as well as fuel consumption; and
- The annual coal consumption data reported by the plant operators will be cross-checked against the data recorded in the coal purchase register of the plant, and the higher value after adjusting for the closing stock at the plant will be used to calculate annual coal consumption.