AAC BLOCKS PROJECT BY MOHIT INDUSTRIES LIMITED, GUJARAT, INDIA

Document Prepared by EnKing International

Project Title	AAC blocks project by Mohit Industries Limited, Gujarat, India
Version	03
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Project ID	1238
Monitoring Period	01-January-2021 to 31-August-2021 (Both days inclusive)
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CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Mohit Industries Limited now named as Big Bloc Construction Limited (hereinafter referred to as MIL or PP) has installed an autoclaved aerated concrete (AAC) blocks manufacturing unit of capacity 300,000 m^3/annum in Gujarat, India. The project activity involves setting up a new facility and is accordingly classified as a Greenfield project. The AAC blocks manufactured at the project plant uses, waste material fly ash generated from thermal power plants as the primary raw material. The AAC blocks produced replaces conventional fired (baked) clay bricks as construction material. The specific energy demand for manufacturing AAC blocks is lower as compared to conventional clay bricks.

The energy requirement for fired clay bricks manufactured in India is supplied predominantly by high carbon intensive fossil fuel sources. AAC blocks are manufactured by the autoclaving process, which is less energy intensive as compared to the thermal baking process used for manufacturing of fired clay bricks. Thus, the project activity results in lower greenhouse gas emission as compared to the conventional clay bricks manufacturing process. In terms of performance standard of AAC blocks, the AAC blocks are being manufactured in compliance with the requirements of the relevant national standard. The GHG emissions accrued from the project activity during the monitoring period 01-January-2021 to 31-August-2021 (both days inclusive) is 43,898 tCO_2e.

Implementation Status:

The project has been implemented on 25-November-2012 and the primary technology for the AAC block manufacturing at the project plant is from M/s Changzhou Mingjie Building Material Equipment Manufacturing Co., Ltd, China. The blocks are manufactured, largely through mechanical processes, using cement, lime, gypsum and fly ash from thermal power plants as major raw materials along with aluminum powder (in small quantities). The batched raw materials are mixed with water and the slurry formed is fed to the moulds to set and form green cakes. The green cakes are finally cured by autoclaving with steam to form the AAC blocks. Steam is generated in coal fired boiler. 25-Novemeber-2012 is the commissioning date of the project, the project is running smoothly since commissioning with no breakdown in the current monitoring period.

1.2 Sectoral Scope and Project Type

The project activity is a non AFOLU project, developed in line with UNFCCC approved CDM methodology. With reference to Appendix B to the simplified modalities and procedures for small scale CDM project activities, the project activity falls under the following category:

Type	4. Manufacturing Industries.
Scale	Small Scale
Category	Z: Fuel switch, process improvement and energy efficiency in brick manufacture
Methodology	AMS-III.Z: Fuel Switch, process improvement and energy efficiency in brick manufacture
Version	04
Weblink	http://cdm.unfccc.int/methodologies/DB/WPNWYRJ0FN59EFPA4A7NABU0849FD3

1.3 Project Proponent

Organization name	Big Bloc Construction Limited
Contact person	Mr. Manish Narayan Saboo
Title	Director
Address	A/601-B, International Trade Centre, Majura Road, Ring Road, Surat, Gujarat, 395-002, India
Telephone	+91 261 2463261
Email	Manishsaboo84@gmail.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Carbon Consultant
Contact person	Prakash Kr Sahu
Title	Project Manager
Address	Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar, Near Brilliant Convention Centre, Indore - 452010 (M.P, India) Website www.enkingint.org
Telephone	+91 9589899649
Email	prakash@enkingint.org

1.5 Project Start Date

The start date of the project activity is 25-November-2012 which corresponds to the first production start date of the NXTBLOCK Autoclaved Aerated Concrete Block.

1.6 Project Crediting Period

Crediting period start date : 25-November-2012
Crediting period end date : 24-November-2022

Length : 10 years 00 months (renewable twice)

1.7 Project Location

Country	India
Region	Western India
State	Gujarat
District	Valsad
Tehsil/Mandal	Umargaon
Village	Khatalwada
Latitude	20.217° N
Longitude	72.794° E
Nearest Airport	Surat
Nearest Railway Station	Surat

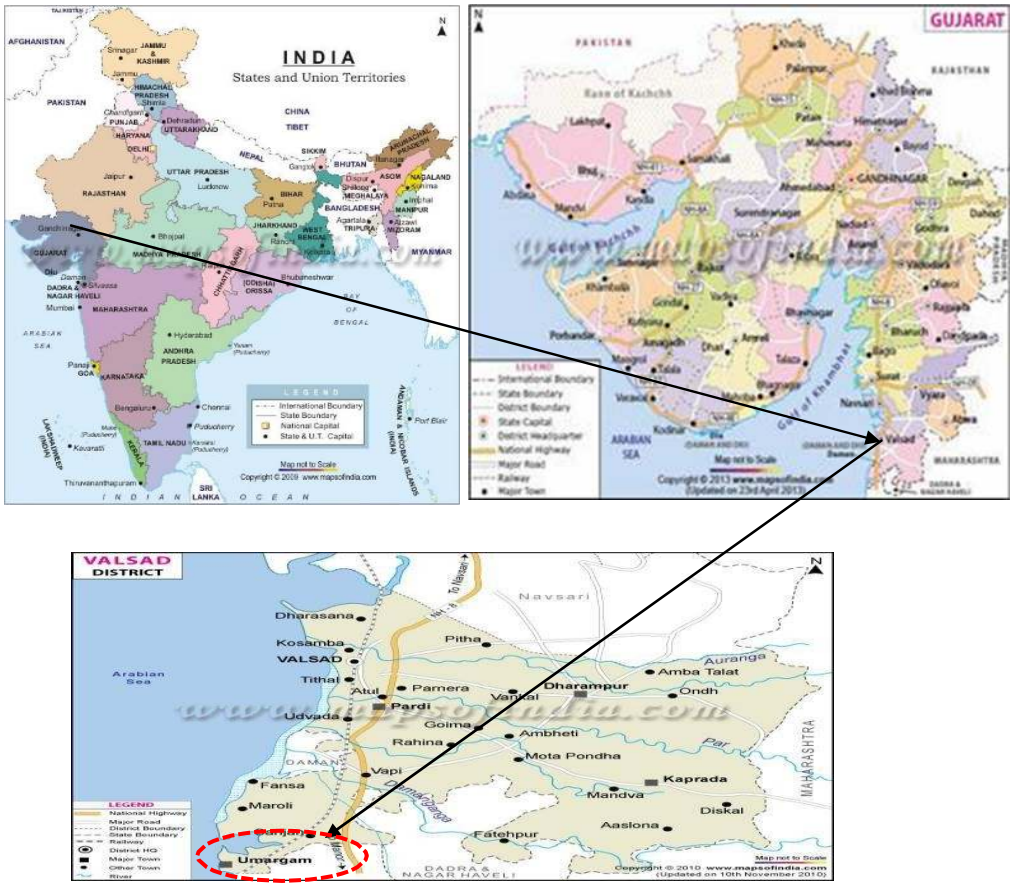


Figure 1. Satellite Image of Project activity.

1.8 Title and Reference of Methodology

The project has been developed using the following baseline and monitoring methodology approved under CDM program of UNFCCC:

Methodology	AMS-III.Z: Fuel Switch, process improvement and energy efficiency in brick manufacture[1]
Version	04
Weblink	http://cdm.unfccc.int/methodologies/DB/WPNWYRJ0FN59EFPA4A7NABU0849FD3

Methodological tools used in the project activity:

- Tool to calculate baseline, project and/or leakage emissions from electricity consumption[2], Version 01, EB 39, Annex 7

Tool to calculate project or leakage CO_2 emission from fossil fuel combustion[3], Version 02, EB 41, Annex 11

1.9 Participation under other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs. The project is registered only in VCS program.

[1] http://cdm.unfccc.int/methodologies/DB/WPNWYRJ0FN59EFPA4A7NABU0849FD3

[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits: The project activity has not participated in Emission Trading Programs and other binding limits.

Other Forms of Environmental Credit: The project has not availed nor it is in the process of availing any other forms of environmental credit.

Participation under Other GHG Programs: The project activity has not participated in any other GHG program.

1.11 Sustainable Development Contributions

The project is not part of any nationally stated sustainable development priorities.

However, since the project is a Greenfield project generation it leads to various economic, social and technological developments in the country.

Economic: The project leads to employment generation, both during construction as well as operational stage leading to overall upliftment of the economic status of the local area. The attendance records as an employment are being submitted for the cross check to VCS VVB.

Technological: The project being a non-conventional project which leads to adoption of a new technology in the country. Such projects encourage further R&D and enhancement/viability for various other players to study and further refine the technology available.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1.	8.6	8.6.1 Proportion of youth (aged 15-24 years) not in education, employment or training	Implemented activities to increase	The Project organize minimum 01 training/ year for the staff on the technology, the monitoring of the plant operation, and the emergency and safety procedures	Overall, 15 trainings are provided since project commissioning.
2.	12.5	Recycling the produced waste	Recycling the produced waste	The project uses fly ash which is a waste material from industries. During the period almost 104,802.71 tonnes of fly ash was used to make AAC blocks	Overall the project has used 1,259,317.23 (145,781.9+543,205.15+4,65,527.47+104802.71) tonnes of fly ash which could have dumped with no usage while increasing atmospheric pollution.
3.	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project, in the current reporting period has resulted in emission reduction of 43,898 tCO_2e into the atmosphere	Overall prevented the release of 410,158 (61,671+122,954+181,635+43,898) tCO_2e into the atmosphere since project commissioning.

2 SAFEGUARDS

2.1 No Net Harm

The facility does not produce any pollution in manufacturing process but proposes to use the waste products like fly ash, which create environmental pollution by increasing dust levels of atmosphere. The project activity will not use fossil fuel except during exigency when DG set may be required to operate for electricity generation. Hence there is positive impact on the environment due to this small-scale project activity of reducing the pollution caused by fly ash and fossil fuels.

The following conditions are applicable to establish that the project activity is environment friendly:

I. There shall be no nuisance due to industrial activity to surroundings.
II. The handling of fly ash i.e. transports, loading and storage shall be done in a scientific manner so as to avoid fugitive emissions and nuisance.
III. Water shall be sprinkled on stored fly ash to avoid fugitive emissions.

The project activity has obtained the No Objection Certificate for Consent to Establish from the Gujarat Pollution Control Board and boiler certificates from boiler inspector, for establishing the manufacturing unit of Autoclaves Aerated Concrete (AAC) Blocks by using fly ash as the main raw material which is the by-products of the nearby thermal power station. The facility does not produce any pollution in manufacturing process but proposes to use the waste products like fly ash, which create environmental pollution by increasing dust levels of atmosphere. Hence there is positive impact on the environment due to this small-scale project activity of reducing the pollution caused by fly ash and fossil fuels.

2.2 Local Stakeholder Consultation

As a part of continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments. For the global stakeholders, the suggestion and the grievance can be submitted to Manishsaboo84@gmail.com. Mr. Tejas Dhoot, an employee of the company who is based at the project location can be contacted, his mobile number is +91 9998449514.

Stakeholder meetings were organized at the time of registration of project activity in order to identify the major challenges around the area, stakeholders were invited well in advance through printed invitation, calls, meeting and a notice is placed around the local common areas. Various CSR activities around site are carried out. The stakeholder is also request to share their experiences and grievances on continuous basis. Registers is used to records the grievances and feedback.

During the current monitoring period, positive feedback is received regarding site operation. No any grievances received during the current monitoring period; therefore, no any mitigation measures are required. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site incharge. The grievance copies have been submitted to VCS VVB.

2.3 AFOLU-Specific Safeguards

Not Applicable

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

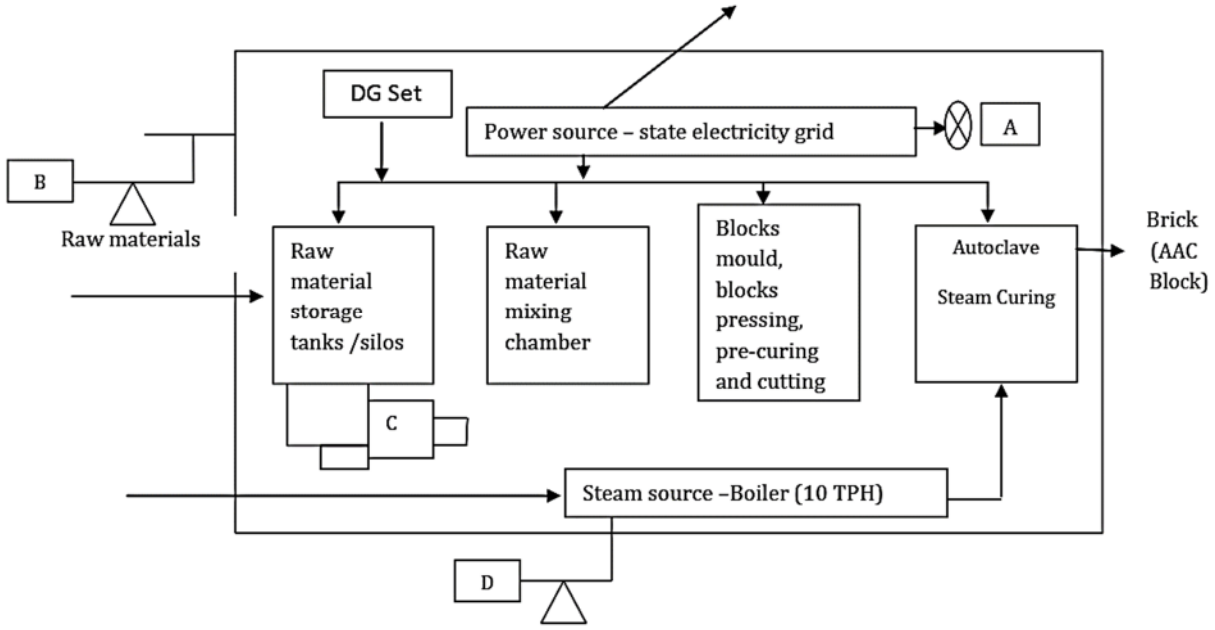
The project activity has been implemented on 25-November-2012. There has not been any change in technology/equipment/ design or any other critical factor which may affect GHG emissions associated with this project activity. The major components of equipment installed as part of project activity are as follows:

- Raw materials storage silos
- Raw material mixer
- Hydraulically operated molding section
- Autoclave section
- Steam boilers
- Compressed air network
- Internal transportation system

Specifications of AAC blocks manufactured under the project activity are as follows:

Particulars	Unit	Value	Remark (if any)
Dimension of AAC blocks	Mm	650X240X150	As per actual production data
Density (dry)	kg/m^3	551-600	As per Lab test Report
Dry shrinkage (maximum)	%	0.1	As per Indian Standard–IS 2185
Thermal conductivity	W/m-K	0.24	
Compressive strength	N/mm^2	>3.75	
Fly ash	%	72.11	Lab test report and actual monitoring data at the plant
Cement	%	18.37	
Lime	%	7.38	
Gypsum	%	2.06	
Aluminum powder	%	0.064	

A brief layout of the metering arrangement has been provided below



Metering Details:

Parameter	Denotes	Instrument Details
$EC_{PJ,y}$ A	Quantity of electricity consumed by the project plant in year y	Energy Meter
RMP_{cement} $RMP_{Fly\ ash}$ RMP_{gypsum} $RMP_{aluminium\ powder}$ RMP_{lime} B	Quantity of cement, Fly ash, gypsum, aluminium powder and lime purchased for producing AAC blocks in the year y	Weighbridge
RMC_{cement} $RMC_{Fly\ ash}$ RMC_{gypsum} $RMC_{aluminium\ powder}$ RMC_{lime} C	Quantity of cement, Fly ash, gypsum, aluminium powder and lime consumed for producing AAC blocks in the year y	Electronic Weighbridge
$FC_{coal,y}$ D	Quantity of coal combusted by the project activity boiler during the year y	Electronic Weighbridge

Diesel Generator Technical Specifications

Particular	Alternator	Engine	Energy Meter
Make	Stamford	Cummins	HPL Socomec
Capacity	500 KVA	600 BHP	3 X -/5 A
Sr. No.	N12E196429	25378061	1K 122653
R.P.M	1500	1500	1600 Imp/Kwh
Voltage	415 V	-	3X240 V
Amp./C.T. Ratio	695.6 AMP	-	800/5 Amp

M.F.	-	-	160

3.2 Deviations

2.1.1 Methodology Deviations

There has not been any methodology deviation which has affected the aforesaid project activity.

2.1.2 Project Description Deviations

The Deviations approved in the previous verification only, the deviation are as follows;

1. Measurement of Raw Material Consumption (using Weigh- Bridge)

   The details of the weigh-bridge used for monitoring the consumption of raw material were missing in the registered VCS PD and has been added. Additionally, the calibration frequency has been set as once in a year.

2. The parameters $D_{f,y}$ & $FR_{f,m}$ has been used to compute the leakage emissions.

   The purpose of monitoring of parameter "Return trip road distance between the origin and destination of freight transportation activity f" (Df,y) and "Total mass of freight transported in freight transportation activity f" (FRf,m) was given as project emission in the registered PD. However, it has been changed to mention leakage emission in line to the applied methodology.

3. The project has added monitoring for the parameter of Diesel Consumption considering the usage of DG sets at site in case of emergency or grid failures. The addition of parameter is based on the conservativeness of project emission calculations.
4. PP name i.e. *Mohit Industries Limited* is changed to *Big Bloc Construction Limited*[4] in 01-April-2015.
5. Change in Meter and Accuracy class:

Old Energy Meter (L&T Make)	Serial No: 11490797	Accuracy class: 0.55 for Active, 1.05 for Reactive
Energy Meter (L&T Make)	Serial No: 09512220	Accuracy class: 0.5 for Active, 1.0 for Reactive

6. The calibration frequency of the energy meters installed at the project site will be conducted once in five years[5].

The deviation applied in the current monitoring period (01-January-2021 to 31-August-2021):

[4] https://www.mohitindustries.com/pages/history/

[5] http://www.cbip.org/MIR/1%20DATA/CEA%201.pdf

1. The deviation is related to increase PLF and subsequent net production. The PLF considered at the time of validation is 51.54% with a net production capacity of 154,625.595 m^3. Over the time net production capacity increases to around 70% plant load factor without any design change and monitoring methodology of the project. Below tabulated data is from the last verification period[6].

Years	2018	2019	2020
$P_{PJ,y}$: net production of the facility (m^3)	272,143	282,918	199,306
Observed Plant PLF (%)	91%	94%	66%
Emission Reductions (tCO_2e)	57,334	59,767	43,084

It is noted that registered PD quotes 61,742 tCO_2e as a baseline emissions and EF_{BL} : Baseline emission factor 0.3993 tCO_2e/m^3, on reverse calculation (61,742/0.3993= 154625.595 m^3) the annual production comes out to be 154625.595 m^3 which represents 51.54%. Also, there is no any impact on additionality due to higher production as additionality is demonstrated based on "barrier due to prevailing practice". By this deviation, the annual emission reduction will remain within the threshold limit of type III project.

3.3 Grouped Projects

The project activity is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF_{BL}
Data unit	tCO_2/m^3
Description	The annual production specific baseline emission factor.
Source of data	Calculated based on data taken from: 1. "Brick and ceramic sectors" report by Asian Institute of Technology[7]

[6] https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=53900&IDKEY=9kjalskjf098234kj28098sfkjlf098098kl32lasjdflkj90974328100

[7] http://faculty.ait.ac.th/visu/wp-content/uploads/sites/7/2019/01/BCS.pdf

	2."Energy Conservation and Pollution Control in brick kilns" report by Sameer Maithel, N Vasudevan, Lt. Col. Rakesh Joshi (Retrd.)[8] 3.Density of bricks taken from www.reade.com
Value applied	0.3993
Justification of choice of data or description of measurement methods and procedures applied	The value is a calculated value. It has been derived based on CO_2 emission per brick data taken from "Brick and ceramic sector report", which has been converted to CO_2 emission per unit volume of baseline brick with weight of each brick taken.
Purpose of Data	This value has been used to baseline emissions
Comments	This value is fixed ex-ante

Data / Parameter	$COEF_{cement}$
Data unit	tCO_2e/kt
Description	CO_2 emission factor of cement production.
Source of data	Cement Sustainability Initiative (CSI) - The Cement CO_2 and Energy Protocol[9]. CO_2 and Energy Accounting and Reporting Standard for the Cement Industry(May 2011) by WBCSD- Version 3.0
Value applied	0.638×10^3
Justification of choice of data or description of measurement methods and procedures applied	This value is a default value as per Cement Sustainability Initiative protocol and is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	This value is fixed ex-ante

Data / Parameter	$COEF_{aluminum}$
Data unit	tCO_2/kt
Description	CO_2 emission factor of aluminum production
Source of data	IPCC 2006 Report Volume 3 Chapter 1 for Soderberg Smelting Technology
Value applied	1.7×10^3
Justification of choice of data or description of	IPCC Report is an authentic source of data. Further, for leakage emission more emission intensive of the two available technologies

[8] https://www.shareweb.ch/site/EI/Documents/PSD/Topics/Social%20Aspects%20of%20Work/Brick%20by%20Brick%20-%20The%20Herculean%20Task%20of%20Cleaning%20up%20the%20Asian%20Brick%20Industry.pdf

[9] https://docs.wbcsd.org/2016/12/GNR.pdf

measurement methods and procedures applied	(Prebake and Soderberg) for aluminum production is taken for conservativeness.
Purpose of Data	Leakage emissions calculation
Comments	This value is fixed ex-ante

Data / Parameter	$COEF_{lime}$
Data unit	tCO_2/kt
Description	CO_2 emission factor of lime production
Source of data	IPCC Guidelines 2006 for NGGI (Vol 3 Ch 2 Eqn 2.8)
Value applied	$0.75x10^3$
Justification of choice of data or description of measurement methods and procedures applied	IPCC 2006 data is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	This value is fixed ex-ante

Data / Parameter	$COEF_{gypsum}$
Data unit	tCO_2/t
Description	CO_2 emission factor of gypsum production
Source of data	Methodology for free allocation of emission allowances in the EU ETS post 2012[10]
Value applied	0.01[11]
Justification of choice of data or description of measurement methods and procedures applied	EU ETS data is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	This value is fixed ex-ante

Data / Parameter	$EF_{CO2,f}$
Data unit	$gCO_2/t\text{-}km$

[10] https://ec.europa.eu/clima/sites/default/files/ets/allowances/docs/bm_study-lime_en.pdf

[11] With reference to the source of data (Methodology for the free allocation of emission allowances in the EU ETS post 2012- Sector report for the gypsum industry), the value has been given as 0.01 tCO2/tonne

Description	Default CO_2 emission factor for freight transportation activity
Source of data	Default value as provided in the methodological tool to calculate "Project and leakage emissions from road transportation of freight" version 01.1.0[12]
Value applied	Light vehicles – 245 Heavy vehicles –129
Justification of choice of data or description of measurement methods and procedures applied	This is a default data as provided by UNFCCC and is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	This value is fixed ex-ante

Data / Parameter	D_{brick}
Data unit	kg/m^3
Description	Density of each baseline brick produced
Source of data	Density of common clay bricks taken from www.reade.com
Value applied	1920
Justification of choice of data or description of measurement methods and procedures applied	This data has been taken from public domain.(www.reade.com)
Purpose of Data	Baseline emissions calculation
Comments	The source of data is a third party publicly available source. The value can also be cross-checked from the following source http://www.simetric.co.uk/si_materials.htm

Data / Parameter	W_{brick}
Data unit	kg
Description	Weight of each baseline brick produced
Source of data	Section 3.0 page 3/29 of the report: "Energy Conservation and Pollution Control in brick kilns" report by Sameer Maithel, N Vasudevan, Lt. Col. Rakesh Joshi (Retrd.)[13]
Value applied	3.75

[12] Project and leakage emissions from transportation of freight
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf

[13] https://fdocuments.in/document/energy-conservation-and-pollution-control-in-brick-kilns.html

Justification of choice of data or description of measurement methods and procedures applied	Higher value of the range of weight provided is chosen for conservativeness. The source of data chosen is an authentic 3rd party source
Purpose of Data	Baseline emissions calculation
Comments	Data references from authentic sources

Data / Parameter	$EF_{CO_2,brick}$
Data unit	$kgCO_2$/brick
Description	CO_2 emission per baseline brick produced
Source of data	Page # 25 of the "Brick and ceramic sectors" report by Asian Institute of Technology[14]
Value applied	0.78
Justification of choice of data or description of measurement methods and procedures applied	Lower value of the range of CO_2 emission per brick provided is chosen for conservativeness. The source of data chosen is an authentic 3rd party source.
Purpose of Data	Baseline emissions calculation
Comments	Report by the "Brick and ceramic sectors" is an authentic source of data

Data / Parameter	$EF_{EL,plant,y}$
Data unit	tCO_2/MWh
Description	Emission factor for electricity used in project plant in year y
Source of data	Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 1
Value applied	1.3
Justification of choice of data or description of measurement methods and procedures applied	Higher of the CO_2 emission factor for captive source (DG set) or the regional grid. Emission factor data for captive source taken from Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 1 and emission factor of NEWNE grid taken from CEA database Version 09[15].
Purpose of Data	Project emissions calculation

[14] http://faculty.ait.ac.th/visu/wp-content/uploads/sites/7/2019/01/BCS.pdf

[15] https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver9.pdf

Comments	The values have been taken from Tool to calculate baseline, project and/or leakage emission from electricity consumption, Version no. 01[16], which is an authentic source of data.

Data / Parameter	$TDL_{plant,y}$
Data unit	%
Description	Average technical transmission and distribution losses for providing electricity to project plant in year y
Source of data	Default value for project electricity source taken from *Tool to Calculate baseline, project and/or leakage emissions from electricity consumption, version 01*[17].
Value applied	20
Justification of choice of data or description of measurement methods and procedures applied	Project emissions calculation
Purpose of Data	The emission factor for project emission has been selected as the default transmission and distribution losses for project emission estimation applicable to scenario CIII. Data taken from "Tool to calculate baseline, project or leakage emission from electricity Consumption", which is an authentic source.
Comments	The values have been taken from Tool to calculate baseline, project and/or leakage emission from electricity consumption, Version no. 01[18], which is an authentic source of data.

4.2 Data and Parameters Monitored

Data / Parameter	Compressive strength of AAC blocks
Data unit	N/mm^2
Description	Compressive strength of project blocks
Source of data	Laboratory test report

[16] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf (Version 01, EB 39, Annex 07, Date: 16-May-2008)

[17] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

[18] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Dry compressive strength of the project block has been tested in nationally approved laboratory.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring Frequency: Once in 6 Months
Recording Frequency: Once in 6 Months</td></tr>
<tr><td>Value monitored</td><td>
<table>
<tr><th>Date of Test</th><th>Value (N/mm²)</th></tr>
<tr><td>07-January-2021</td><td>3.74</td></tr>
<tr><td>13-February-2021</td><td>4.45</td></tr>
<tr><td>27-February-2021</td><td>3.73</td></tr>
<tr><td>06-March-2021</td><td>4.80</td></tr>
<tr><td>01-April-2021</td><td>5.42</td></tr>
<tr><td>19-May-2021</td><td>4.32</td></tr>
<tr><td>21-June-2021</td><td>3.98</td></tr>
<tr><td>06-July-2021</td><td>4.92</td></tr>
<tr><td>20-August-2021</td><td>4.17</td></tr>
</table>

As per Indian Standard on common burnt clay building bricks – specifications (IS 1077:1992) published by Bureau of Indian Standards, Government of India[19], the compressive strength of the lowest class of clay bricks is 3.5 N/mm², while the average compressive strength of AAC blocks as taken from laboratory test certificate for the monitoring period is 4.385 N/mm², which is more than the compressive strength of lowest class of baseline bricks.</td></tr>
<tr><td>Monitoring equipment</td><td>Not Applicable as Compressive strength test was carried out in external laboratory and not at plant site.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>NABL accredited laboratory has been appointed for all the lab analysis</td></tr>
<tr><td>Purpose of the data</td><td>Baseline Emissions</td></tr>
<tr><td>Calculation method</td><td>This is a measured data. Hence not applicable.</td></tr>
<tr><td>Comments</td><td>All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.</td></tr>
</table>

Data / Parameter	Density of AAC blocks
Data unit	kg/m³
Description	Density of AAC blocks
Source of data	Laboratory test report

[19]Table 1 of https://www.iitk.ac.in/ce/test/IS-codes/is.1077.1992.pdf

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Density of the project block has been tested at a nationally approved laboratory.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring Frequency: Once in 6 Months

Recording Frequency : Once in 6 Months</td></tr>
<tr><td>Value monitored</td><td><table><tr><th>Date of Test</th><th>Value (Kg/m³)</th></tr><tr><td>25-January-2021</td><td>593</td></tr><tr><td>13-February-2021</td><td>618</td></tr><tr><td>27-February-2021</td><td>580</td></tr><tr><td>06-March-2021</td><td>606</td></tr><tr><td>01-April-2021</td><td>596</td></tr><tr><td>19-May-2021</td><td>601</td></tr><tr><td>21-June-2021</td><td>553</td></tr><tr><td>06-July-2021</td><td>551</td></tr><tr><td>20-August-2021</td><td>589</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>Not Applicable as Compressive strength test was carried out in external laboratory and not at plant site.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>NABL accredited laboratory has been appointed for all the lab analysis.</td></tr>
<tr><td>Purpose of the data</td><td>Baseline Emissions</td></tr>
<tr><td>Calculation method</td><td>This is a measured data. Hence not applicable.</td></tr>
<tr><td>Comments</td><td>All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>$P_{PJ,y}$</td></tr>
<tr><td>Data unit</td><td>M³</td></tr>
<tr><td>Description</td><td>The annual production of the facility in year y</td></tr>
<tr><td>Source of data</td><td>Plant Records – production log book data</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Number of standard sized cakes being manufactured is being monitored manually. Number of cakes manufactured has been converted to volume units.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring frequency: Continuously

Recording frequency: Daily</td></tr>
<tr><td>Value monitored</td><td><table><tr><th>Period</th><th>Total Production(m³)</th></tr><tr><td>01-January-2021 to 31-</td><td>201,817.80</td></tr></table></td></tr>
</table>

	August-2021 |
Monitoring equipment	Number of blocks produced have been manually counted
QA/QC procedures to be applied	Blocks selling data and blocks stocks data can be used for verification of figures.
Purpose of the data	This data has been used to calculate Baseline Emission
Calculation method	Production(m^3) = (Number of cakes in kg) x (Density in kg/m^3)
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$FC_{coal,y}$
Data unit	kT
Description	Quantity of coal combusted by the project activity boiler during the year y
Source of data	Plant log book
Description of measurement methods and procedures to be applied	Coal Consumption has been measured with Electronic Weighbridge. Coal inventory has been maintained and monitored through the equation: Coal consumed = Opening Stock + Purchases – Closing Stock
Frequency of monitoring/recording	Monitoring frequency: Daily Recording frequency: Daily
Value monitored	Period: 01-January-2021 to 31-August-2021 | Coal Consumption(kt): 4.98
Monitoring equipment	Electronic weighbridge has been used to measure the parameter ($FCC_{coal,y}$).
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge
Purpose of the data	This data has been used to calculate project emissions
Calculation method	The following equation has been used to ascertain the coal consumption quantity: Quantity = Opening Stock + Purchases – Closing stock

Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$NCV_{,coal,y}$
Data unit	TJ/kt
Description	Weighted average net calorific value of coal in the year y
Source of data	IPCC 2006 Vol. 2 Chapter 1[20]
Description of measurement methods and procedures to be applied	Higher value of the uncertainty range of IPCC default values as provided in Table 1.2 Vol. 2 of the 2006 IPCC Guidelines has been selected
Frequency of monitoring/recording	Monitoring frequency: Every update of IPCC Recording frequency: Annually
Value monitored	26
Monitoring equipment	The value is taken from IPCC's publicly available report
QA/QC procedures to be applied	IPCC data is an authentic source; hence no QA/QC was required.
Purpose of the data	This data has been used to calculate the project emissions due to coal consumption.
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$EF_{coal,y}$
Data unit	tCO_2/TJ
Description	Weighted average CO_2 emission factor of coal in the year y
Source of data	Table 1.2 Vol. 2 of the 2006 IPCC Guidelines

[20] Higher NCV of Anthracite coal is considered for the calculation Table 1.2 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Description of measurement methods and procedures to be applied	Higher value of the uncertainty range of IPCC default values as provided in Table 1.4 Vol. 2 of the 2006 IPCC Guidelines has been selected
Frequency of monitoring/recording	Monitoring frequency: Every update of IPCC Recording frequency: Annually
Value monitored	100
Monitoring equipment	The value is taken from IPCC's publicly available report.
QA/QC procedures to be applied	IPCC data is an authentic source; hence no QA/QC was required.
Purpose of the data	Project Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh
Description	Quantity of electricity consumed by the project activity in year y
Source of data	Plant records – Electricity consumption logbook
Description of measurement methods and procedures to be applied	Energy meter has been used to measure the electricity consumption by the project activity.
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Daily
Value monitored	Period: 01-January-2021 to 31-August-2021; Electricity Consumption (MWh): 1,142.4
Monitoring equipment	Energy Meter has been used to measure the electricity consumption in the project activity.
QA/QC procedures to be applied	DISCOM energy invoices are used for the cross check. The QA/QC of the parameter has been ensured by timely calibration of the energy meter.

Purpose of the data	This data has been used to calculate Baseline Emission
Calculation method	Not Applicable. This is a directly measured parameter
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMP_{cement,y}$
Data unit	kT
Description	Quantity of cement purchased for producing AAC blocks in the year y
Source of data	Purchase records maintained at plant.
Description of measurement methods and procedures to be applied	Cement purchased for producing AAC blocks have been measured using weighbridge.
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency : Monthly
Value monitored	Period: 01-January-2021 to 31-August-2021; Cement Purchased(kt): 20.46
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMC_{cement,y}$
Data unit	kT

Description	Quantity of cement consumed for producing AAC blocks in the year y
Source of data	Consumption records maintained at plant
Description of measurement methods and procedures to be applied	Cement consumed for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Batch-Wise Recording frequency : Daily
Value monitored	Period: 01-January-2021 to 31-August-2021; Cement Consumption(kt): 20.66
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMP_{Fly\ ash,y}$
Data unit	kT
Description	Quantity of Fly ash purchased for producing AAC blocks in the year y
Source of data	Purchase records maintained at plant
Description of measurement methods and procedures to be applied	Fly ash purchased for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value monitored	Period | Fly ash Purchased(kt)

	01-January-2021 to 31-August-2021: 95.73
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMC_{Fly\ ash,y}$
Data unit	kT
Description	Quantity of Fly ash consumed for producing AAC blocks in the year y
Source of data	Consumption records maintained at plant
Description of measurement methods and procedures to be applied	Fly ash consumed for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Batch-wise Recording frequency : Daily
Value monitored	Period: 01-January-2021 to 31-August-2021; Fly ash Consumption(kt): 104.80
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.

Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMP_{Lime,y}$
Data unit	kT
Description	Quantity of Lime purchased for producing AAC blocks in the year y.
Source of data	Purchase records maintained at plant
Description of measurement methods and procedures to be applied	Lime purchased for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value monitored	Period: 01-January-2021 to 31-August-2021; Lime Purchased(kt): 7.98
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMC_{Lime,y}$
Data unit	kT
Description	Quantity of lime consumed for producing AAC blocks in the year y
Source of data	Consumption records maintained at plant

Description of measurement methods and procedures to be applied	Lime consumed for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Batch-wise Recording frequency: Daily
Value monitored	Period: 01-January-2021 to 31-August-2021; Lime Consumption(kt): 8.11
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMP_{gypsum,y}$
Data unit	kT
Description	Quantity of gypsum purchased for producing AAC blocks in the year y
Source of data	Purchase records maintained at plant
Description of measurement methods and procedures to be applied	Gypsum purchased for producing AAC blocks have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Every Purchase of Raw Material Recording frequency: Monthly
Value monitored	Period: 01-January-2021 to 31-August-2021; Gypsum Purchased(kt): 0.806
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.

QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMC_{gypsum,y}$
Data unit	kT
Description	Quantity of gypsum consumed for producing AAC blocks in the year y
Source of data	Consumption records maintained at plant
Description of measurement methods and procedures to be applied	Quantity of Gypsum consumed for producing AAC blocks have been have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value monitored	Period: 01-January-2021 to 31-August-2021; Gypsum Consumption(kt): 0.774
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMP_{aluminium,y}$

Data unit	kT
Description	Quantity of Aluminum powder purchased for producing AAC blocks in the year y
Source of data	Purchase records maintained at plant
Description of measurement methods and procedures to be applied	Aluminum Powder purchased for producing AAC blocks have been have been measured using weighbridge
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value monitored	Period: 01-January-2021 to 31-August-2021; Aluminum Powder Purchased(kt): 0.09
Monitoring equipment	Electronic Weighbridge has been used to measure the parameter.
QA/QC procedures to be applied	The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.
Purpose of the data	This data has been used to calculate leakage.
Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$RMC_{aluminum,y}$
Data unit	kT
Description	Quantity of aluminum powder consumed for producing AAC blocks in the year y
Source of data	Consumption records maintained at plant
Description of measurement methods and procedures to be applied	Quantity of aluminum powder consumed for producing AAC blocks have been have been measured using weighbridge

<table>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring frequency: Every purchase of raw material

Recording frequency: Monthly</td></tr>
<tr><td>Value monitored</td><td><table><tr><th>Period</th><th>Aluminum Powder Purchased(kt)</th></tr><tr><td>01-January-2021 to 31-August-2021</td><td>0.09</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>Electronic Weighbridge has been used to measure the parameter.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The QA/QC of the parameter has been ensured by timely calibration of the weighbridge.</td></tr>
<tr><td>Purpose of the data</td><td>This data has been used to calculate leakage.</td></tr>
<tr><td>Calculation method</td><td>This is a measured parameter.</td></tr>
<tr><td>Comments</td><td>All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>D_{Gy}</td></tr>
<tr><td>Data unit</td><td>Litre</td></tr>
<tr><td>Description</td><td>Quantity of Diesel consumed in the plant in the year y</td></tr>
<tr><td>Source of data</td><td>Consumption records maintained at plant</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Quantities of diesel consumed are monitored based on diesel consumed and filled in the DG set.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring frequency: Batch-wise/Every time Diesel is filled in the DG set

Recording frequency: Monthly</td></tr>
<tr><td>Value monitored</td><td><table><tr><th>Period</th><th>Consumption (litre)</th></tr><tr><td>01-January-2021 to 31-August-2021</td><td>29,250</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>Measuring Can/Drums are used to fill Diesel</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Purchase invoices have also been used to cross verify the total Diesel purchase from 3rd party sources.</td></tr>
<tr><td>Purpose of the data</td><td>This data has been used to calculate project emission.</td></tr>
</table>

Calculation method	This is a measured parameter.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$D_{f,y}$
Data unit	Km
Description	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
Source of data	Purchase records
Description of measurement methods and procedures to be applied	This data has been measured using online maps and purchase invoices
Frequency of monitoring/recording	Monitoring frequency: Whenever road trip distance changes Recording frequency: Whenever road trip distance changes
Value monitored	See table below
Monitoring equipment	Purchase invoices and online maps are 3rd party applications.

Raw Mat.	From	To	Round-trip Distance
Cement[21]	Surat	Umargaon	139
Fly ash[22]	Dahanu	Umargaon	43
Lime[23]	Nagaur	Umargaon	980
Gypsum[24]	Rajkot	Umargaon	603
Aluminum Powder[25]	Nagpur	Umargaon	894
Coal[26]	Mundra Port	Umargaon	709

[21] Surat to Project Site

[22] Dahanu to Project Site

[23] Nagaur to Project Site

[24] Morbi Rajkot to Project Site

[25] Nagpur to Project Site

[26] Mundra Port to Project Site

QA/QC procedures to be applied	This is a third party data.
Purpose of the data	This data has been used to calculate leakage emissions.
Calculation method	Round-trip road travel distances calculated from online maps.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	$FR_{f,m}$
Data unit	Tonne
Description	Total mass of freight transported in freight transportation activity f in monitoring period m
Source of data	Purchase records
Description of measurement methods and procedures to be applied	This parameter has been measured through Raw material purchase invoices. Raw materials include (cement, fly ash, limestone, gypsum & aluminum powder).
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Monthly
Value monitored	See table below
Monitoring equipment	3rd party purchase invoices would be used to ascertain this parameter
QA/QC procedures to be applied	This is a third party data.
Purpose of the data	This data would be used to calculate leakage emissions
Calculation method	Not Applicable.
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Period	Freight Type	Total Freight Transported
01-January-2021 to 31-August-2021	Cement	20,460.63
	Fly ash	95,733
	Lime	7938
	Gypsum	806
	Aluminum Powder	89.88
	Coal	5,090.23

Data / Parameter	**The vehicle class used**
Data unit	-
Description	The vehicle class used for freight transportation
Source of data	Transportation records
Description of measurement methods and procedures to be applied	Vehicle type (light/heavy) used for raw material transportation has been monitored based on road challan for raw material transported during each transportation activity.
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Every receipt of raw materials at site
Value monitored	From the purchase records, it has been found that the raw materials have been transported in heavy vehicles
Monitoring equipment	Weigh bills and UNFCCC guidelines15 are 3rd party sources of data.
QA/QC procedures to be applied	This is a third party data.
Purpose of the data	This data has been used to determine leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan involves structure for:

- Monitoring, recording and archiving of all data required for calculation of ex-post emission reduction from the project.
- Storing documents required for emission reduction calculations.
- Conducting/arranging calibration tests for monitoring equipment
- Ensuring quality of recorded data
- Coordinating with consultants and verifiers to submit monitored data to APX VCS Registry for verification.

The monitoring team is structured as follows:

Position	Report to:
Operators	

Supervisor Managers (Technical/Maintenance)	Plant head
VCS monitoring project manager	

Detailed responsibility of each member in the monitoring team is provided below:

#	Tasks description	Operator(s)	Supervisor	Plant Manager	VCS monitoring project manager
Monitoring activity					
1	Recording of monitored data	✓	✓		
Quality Assurance & Quality Control					
2	Verification of data monitored (consistency and completeness)		✓	✓	
3	Ensuring adequate training of staff			✓	✓
4	Ensuring adequate maintenance		✓	✓	✓
	Ensuring calibration of monitoring instruments		✓	✓	✓
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup)			✓	✓
	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement			✓	✓
7	Emergency procedures		✓	✓	
Calculation of GHG emission reductions and reporting					
8	Processing of data and calculation of emission reductions				✓
9	Monitoring report: management review of monitoring report (internal audit)			✓	✓

Data Collection & Storage:

All data has been collected in paper log books and/or online data collection system and has been converted to spreadsheet form on an annual basis. It has been ensured that raw data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later. In case there is any inconsistency on monitored data, the period will be removed from emission reduction crediting period, unless sufficiently reliable alternative methods are available and validated by external agencies appointed to verify monitoring report submitted to VCS Board.

QA & QC Procedures followed:

All meters have been calibrated as per industry practices at regular intervals. Records of calibration certificates have been maintained for verification. The details of the calibrations have been provided below:

Equipment	Serial Number	Make	Calibration Date	Accuracy Class
Electronic Weighbridge	09201718	Endeavour	30-September-2016	III
			29-September-2017	
			28-September-2018	
			22-September-2019	
			09-September-2020	
Energy Meter	09512220	L&T	06-June-2016	0.5 for Active 1.0 for Reactive
			13-June-2018	

Calibration Dates: Calibration details are provided along with documentary evidences to the DOE.

The calibration validity of the electronic weighbridge and the energy meters are 08-September-2021 and 12-June-2023 respectively.

Emergency Preparedness: In the event of emergency situations like non-functioning of equipment's/instruments, the same has to be reported to Plant Head. The faulty equipment/instrument would be replaced with immediate effect. In the event of unavailability of the instrument, the emission reductions for the concerned would not be considered and generation records for the aforesaid months would be adjusted with reference to the guidelines for assessing compliance with the calibration frequency requirements.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions are quantified in line with paragraph 15 of the methodology AMS- III.Z Fuel Switch, process improvement and energy efficiency in brick manufacture (Version 04) as follows:

$BE_y = EF_{BL} * P_{PJ,y}$

Where:

BE_y	tCO_2e	The annual baseline emissions from fossil fuels displaced by the project activity in the year y
EF_{BL}	tCO_2/m^3	The annual production specific baseline emission factor
$P_{PJ,y}$	m^3	The annual net production of the facility in year y

For the project activity

Annual Net Production of the facility from 01-January-2021 to 31-August-2021 is 201,817.80 m^3
Specific Baseline Emission Factor=0.3993 tCO_2/m^3

As per Equation No.1 Baseline Emissions for the aforesaid monitoring period has been calculated as:

Period	Annual Production ($P_{PJ,y}$)	Specific Baseline (EF_{BL})	Baseline Emission (BE_y)
Units	m^3	tCO_2/m^3	tCO_2
01-January-2021 to 31-August-2021	201,817.80	0.3993	80,585

Baseline Emission (BE_y) for the current monitoring period is 80,585 tCO_2e.

5.2 Project Emissions

Project emission sources relevant for this project are:

- Project emissions from electricity consumption within the project boundary.
- Project emissions from coal consumption in the boiler for steam generation.
- Project emissions from diesel consumption in the DG set within project boundary.

Thus, Project Emission (PE_y) = $PE_{elec,y} + PE_{Coal,y} + PE_{Diesel,y}$

Project emission from electricity consumption within the project boundary:

Referring to, "Tool to calculate baseline, project and/or leakage emission from electricity consumption", version no. 01[27] the project emission from electricity consumption has been calculated as follows:

$$PE_{elec,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

$PE_{elec,y}$	tCO_2/yr	Project emission due to electricity consumption in year y
$EC_{PJ,j,y}$	MWh/yr	Quantity of electricity consumed by the project emission source j in year y
$EF_{EL,j,y}$	tCO_2/MWh	Emission factor for electricity generation for source j in year y
$TDL_{j,y}$	%	Average technical transmission and distribution losses for providing electricity to source j in year y

For the project activity

Quantity of electricity consumed by the project activity from 01-January-2021 to 31-August-2021 is 1,142.4 MWh

[27] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am -tool-05-v1.pdf (Version 01, EB 39, Annex-7, date 16-May-2008)

Emission factor for electricity generation for source j in year y[28]=1.3
Average technical transmission and distribution losses for providing electricity to project=20%

As per the equation mentioned above

Period	Electricity Consumption ($EC_{PJ,j,y}$)	Emission Factor ($EF_{EL,j,y}$)	Project Emission ($PE_{elec,y}$)
	MWh	tCO_2/MWh	tCO_2
01-January-2021 to 31-August-2021	1,142.4	1.3	1,783

- <u>Project emissions from coal consumption in the boiler for steam generation:</u>

As per the tool, CO_2 emission from fossil fuel combustion are calculated based on quantity of fuels combusted and the CO_2 emission co-efficient of these fuels.

The applicable equation is:

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where,

$PE_{FF,y}$	Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)
$FC_{i,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

As per the tool, the CO_2 emission coefficient can be calculated using one of the options, depending on the availability of data.

- Option A: Based on the chemical composition of the fossil fuel type i
- Option B: Based on the net calorific value and the CO_2 emission factor of the fuel type i.

Based on availability of data, Option B has been used to calculate the CO_2 emission co-efficient as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

[28] Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 01 (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am -tool-05-v1.pdf(Version 01, EB 39, Annex-7, date 16-May-2008)

$EF_{i, y}$ Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

$PE_{Coal.y} = FC_{Coal.y} * COEF_{Coal.y}$

$COEF_{Coal, y} = NCV_{Coal, y} * EF_{Coal, y}$

For the project activity:

Period	Coal Consumption	Weighted average net calorific value of coal	Weighted average CO_2 emission factor of coal	Project Emissions from Coal Consumption
	kt	TJ/kt	tCO_2/TJ	tCO_2
01-January-2021 to 31-August-2021	4.98	26	100	12,959

- **Project emissions from diesel consumption in the DG set within project boundary**

As per the project emissions tool calculation, CO_2 emission from fossil fuel combustion are calculated based on quantity of fuels combusted and the CO_2 emission co-efficient of these fuels.

The applicable equation is:

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FF,y}$ Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)

$FC_{i,y}$ Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)

$CO_{EFi,y}$ Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

As per the tool, the CO_2 emission coefficient can be calculated using one of the options, depending on the availability of data.

- Option A: Based on the chemical composition of the fossil fuel type i
- Option B: Based on the net calorific value and the CO_2 emission factor of the fuel type i.

Based on availability of data, Option B has been used to calculate the CO_2 emission co-efficient as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{i,y}$	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

$$PE_{Diesel.y} = DG_y * COEF_{Diesel.y} * Density\ of\ Diesel$$

$$COEF_{Diesel,y} = NCV_{Diesel,y} * EF_{Diesel,y}$$

$PE_{Diesel.y}$	tCO_2e/yr	Project emissions due to Diesel consumption in year y
DG_y	TJ/Gg	Quantity of Diesel consumed by the project emission source j in year y
$COEF_{Diesel,y}$	tCO_2e/TJ	Emission factor for Diesel generation for source j in year y
Density of Diesel	KG/litres	Density of Diesel

Using equation above:

Period	Diesel Consumption	Weighted average net calorific value of Diesel	Weighted average CO_2 emission factor of Diesel	Density of Diesel	Project Emissions from Diesel Consumption
	Litres	TJ/Gg	tCO_2/TJ	KG/litres	tCO_2
01-January-2021 to 31-August-2021	29,250	43.3	74.1	0.85	80

Total Project Emissions (PE_y) for the current monitoring period has been tabulated below:

Period	Project Emissions from electricity consumption within the project boundary	Project Emissions from Coal Consumption	Project Emissions from Diesel Consumption	Total Project Emissions from the Project Activity
	tCO_2	tCO_2	tCO_2	tCO_2
01-January-2021 to 31-August-2021	1,783	12,959	80	14,822

5.3 Leakage

Leakage emission sources relevant for this project are:

- Leakage emissions due to raw material production
- Leakage emission due to raw material transportation
- Leakage emissions due to raw material production

Leakage emission due to raw material production has been calculated based on the formula:

$$LE_{rm,\ prod,\ y} = RMC_{cement,\ y} * COEF_{cement} * RMC_{lim\ e,\ y} * COEF_{lime} * RMC_{gypsum,\ y} * COEF_{gypsum} + RMC_{aluminium.y} * COE_{F_{aluminium}}$$

Where:

$LE_{rm,prod,y}$	tCO_2	Leakage emission from raw material production in the year y
$RMC_{cement,y}$	kt	Quantity of cement consumed for producing AAC blocks in the year y
$COEF_{cement}$	tCO_2/kt	CO_2 emission factor of cement production
$RMC_{lime,y}$	kt	Quantity of lime consumed for producing AAC blocks in the year y
$COEF_{lime}$	tCO_2/kt	CO_2 emission factor of lime production
$RMC_{gypsum,y}$	kt	Quantity of gypsum consumed for producing AAC blocks in the year y
$COEF_{gypsum}$	tCO_2/kt	CO_2 emission factor of gypsum production
$RMC_{aluminium,y}$	kt	Quantity of aluminium powder consumed for producing AAC blocks in the year y
$COEF_{aluminium}$	tCO_2/kt	CO_2 emission factor of aluminium production

For the project activity:

Period	Freight Type	Raw Material consumed	Specific GHG Emissions
01-January-2021 to 31-August-2021	Raw Material	Tonnes	tCO_2/tonne of raw material
	Cement	20659.48	0.638
	Fly ash	104802.71	0
	Lime	8,110.45	0.75
	Gypsum	774.61	0.01
	Al.Powder	90.25	1.7
	Coal	4,984.16	0

<u>Leakage emissions due to raw material transportation:</u>

Leakage emission due to raw material transportation has been calculated based on the formula Where:

$$LE_{rm,trans,y} = \sum_{f} D_{f,y} * FR_{f,y} * EF_{CO2,f} * 10^{-6}$$

For the project activity

$LE_{rm,trans,y}$	tCO_2	Leakage emission from road transportation of freight in monitoring period m
$D_{f,y}$	km	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
$FR_{f,m}$	tonne	Total mass of freight transported in freight transportation activity f in monitoring period m
$EF_{CO_2,f}$	$gCO_2/t\text{-}km$	Default CO_2 emission factor for freight transportation activity f
F	km	Freight transportation activities conducted in the project activity in monitoring period m

Period	Freight Type	Raw Material Transported	Total Round trip distance	Default CO_2 Emission Factor for Freight Transportation activity
01-January-2021 to 31-August-2021	Raw Material	Tonnes	Kms	$gCO_2/t\text{-}km$
	Cement	20,460.63	139	129
	Fly ash	95,732.64	43	129
	Lime	7937.68	980	129
	Gypsum	805.79	603	129
	Al.Powder	89.88	894	129
	Coal	5,090.23	709	129

Total Leakage Emissions (LE_y) for the monitoring has been tabulated below

Period	Leakage Emissions from Raw Material Production	Leakage Emissions from Raw Material Transportation	Total Leakage Emissions from the Project Activity
	tCO_2	tCO_2	tCO_2
01-January-2021 to 31-August-2021	19,425	2,440	21,865

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or

				removals (tCO_2e)
01-January-2021 to 31-August-2021	80,585	14,822	21,865	43,898
Total	**80,585**	**14,822**	**21,865**	**43,898**

A total of 65.05% increase in overall emission reduction achieved during the current monitoring period. The observed PLF is 67% during the current monitoring period. There are no any design changes for the project activity and increase is due to high production only. Also, there is no any impact on additionality due to higher production as additionality is demonstrated based on "barrier due to prevailing practice".