MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT

Title	**:**	Energy Efficient AAC Block Manufacturing by Magicrete Building Solutions Pvt. Ltd (Navsari).
Version	**:**	3.0
MR Date	**:**	08/03/2024
First CoU Issuance Period	**:**	9 years
First Monitoring Duration	**:**	01/01/2013 to 31/12/2021

	Monitoring Report (MR) **CARBON OFFSET UNIT (CoU) PROJECT**

BASIC INFORMATION

Title of the project activity	Energy Efficient AAC Block Manufacturing by Magicrete Building Solutions Pvt. Ltd (Navsari).
UCR Project Registration Number	345
Version	3.0
Completion date of the MR	08/03/2024
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: (first and last days included (01/01/2013 to 31/12/2021)
Project participants	Creduce Technologies Private Limited (Aggregator) Magicrete Building Solutions Pvt. Ltd. (Project Owner)
Host Party	India
Applied methodologies and standardized baselines	Applied Baseline Methodology: AMS-III.Z.: “Fuel Switch, process improvement and energy efficiency in brick manufacture”, Version 06.0
Sectoral Scope	04 Manufacturing industries
Estimated amount of GHG emission reductions for this monitoring period	2013 : 23669 CoUs (23669tCO$_2$e) 2014 : 27397 CoUs (27397 tCO$_2$e) 2015 : 60938CoUs (60938 tCO$_2$e) 2016 : 52404CoUs (52404 tCO$_2$e) 2017 : 61003CoUs (61003 tCO$_2$e) 2018 : 70734 CoUs (70734 tCO$_2$e) 2019 : 61488CoUs (61488 tCO$_2$e)

	2020	:	46401 CoUs (46401 tCO_2e)
	2021	:	74570 CoUs (74570 tCO_2e)
Total:	478604 CoUs (478604 tCO_2e)		

SECTION - A - Description of project activity

A.1 Purpose and General description of Carbon offset Unit (CoU) project activity

Magicrete Building Solutions Pvt. Ltd. Is engaged in the production of high-quality grade I Aerated Autoclaved Concrete (herein after called as AAC) blocks as per IS 2185 Part 3 (Title : "CONCRETE MASONRY UNITS – AUTOCLAVED CELLULAR (AERATED) CONCRETE BLOCKS") and products. Magicrete is India's frontline producer of AAC blocks, wall panels, drymix Mortars & precast construction solutions, founded in 2008. Magicrete is a pioneer in green building materials, its vision is to help people build their homes better cheaper & faster by using innovative construction technologies. Magicrete has two state-of-the-art manufacturing facilities which are located at Navsari, near Surat on the Mumbai-Surat highway & in Jhajjar, Haryana near Gurgaon. Their plants are strategically located close to thermal power plants which ensure a smooth supply of raw materials. The plants are also within a 250 km radius of most urbanized regions of India like Delhi, Gurgaon in case of Jhajjar plant and Mumbai, Pune, Nasik, Surat, Vadodara, Bharuch, Ahmedabad in case of Navsari Plant.

The core of this technology is the AAC blocks composition and its chemistry, with fly ash from thermal plants mixed with Lime, Cement, Gypsum and Aluminium powder, which enable the blocks to acquire the mechanical properties required during the hydration and curing process without being sintered.

The main goal of this project is to create a high-quality walling material and a well-insulating building material by adopting an efficient, low-energy-intensive brick production process. This process aims to replace the use of high-energy-intensive methods like Clay Brick Bull's trench kilns (BTKs) and make a positive impact on energy consumption at both the brick production and building operation levels.

The project focuses on manufacturing Aerated Autoclaved Concrete (AAC) blocks, which offer numerous advantages. These blocks have impressive compressive strength, are lightweight, easy to construct, and economically viable for transportation. By employing this method as a substitute for traditional bricks produced in kilns, which are CO_2-intensive, the project proponent aims to reduce greenhouse gas emissions. By adopting this low-carbon technology, the project contributes to decreasing emissions and promoting a cleaner environment.

While attaining the prime objective the project activity will also

a) Reduce GHG emissions associated to energy consumption (both fossil fuel and electricity) in the high energy intensive BTKs by an energy efficient brick making technology.

b) Reduce air pollution by introducing robust air treatment facilities in the project activity; the clay brick kiln technology is adopted by an unorganized sector with very poor air treatment facilities;

c) Enhance use of fly ash, an industrial -waste, as a major ingredient of building material.

These manufacturing processes of AAC require electricity and steam generation for operation. The consumption of such forms of energy electricity/fuel to generate steam is much lower compared to the thermal energy consumed for production of burnt clay bricks. Further AAC block technology needs cement and lime as process inputs, which are sources of emissions during their production.

The scenario existing prior to the implementation of the project activity and the baseline scenario:

This is a green field project. Prior to proposed project activity, there was no AAC block/brick manufacturing facility at the project location. The mostly the fly ash generated is dumped in the open and disposed of without using them at the thermal power station. In clay brick manufacturing, sintering process requires huge amount of thermal energy inputs, which is sourced majorly from the fossil fuel-coal combustion with a small quantum from combustion of biomass in the form of fuel wood. Production of AAC blocks and panels does not require any sintering process as the project activity eliminates the burning of fossil fuel as required in the clay brick production. So the amount of such energy, which is required in the project activity scenario, is much lower than the thermal energy required in clay brick manufacturing process. Therefore, the project activity enables total energy reduction and its associated GHG reduction due to change in brick production process. It may be worthwhile to note that there will be some emissions associated to production of raw materials (cement and lime) used in the project activity, which will be accounted for as leakages to project activity.

The spatial extent of project boundary is the NEWNE grid, manufacturing unit of the AAC and source of raw materials.

Table -1- Details of the project activity is tabulated below;

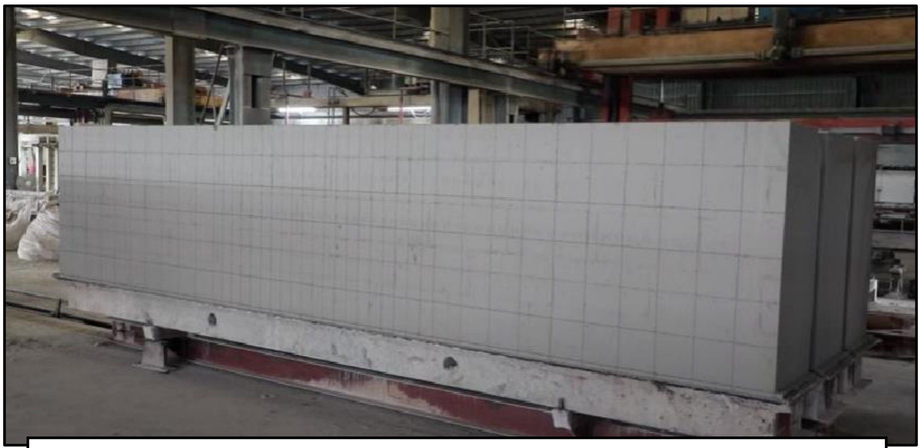
Location	Magicrete Building Solutions Pvt. Ltd, Block No-188 B-190 192/1, 192/2, Post-Arak Tal-Jalalpore - 394315
Plant Capacity	24,955 m^3 per month (approx.)
Autoclave	16 nos., Designed Pressure – 16 bar
DG Sets	2 nos; 400 kVA and 320 kVA
Boiler	Tag - GT 6391 Capacity - 8TPH Operating Pressure – 15 kg/cm^2 Operating Temperature 195 °C to 198 °C.
Operating days in a year	365
Raw Material	Flyash, Lime, Cement, GYP, Aluminum
Standard Size of AAC Block	500 x 250 x 150 mm as per IS 2185-3: 1984
Compressive Strength (MPa)	4.24
Density (kg/m^3)	550-600

Thermal Conductivity (W/m k)	0.20
Start Date of Project	05/10/2009

Dosing & Mixing of Raw Materials

Preparation of mould

Demoulding of mixture



Wire Cutting of processed semi-solid Mixture

Steam Curing Process (Autoclave Reactor)

Finished Product ready to be dispatched to the construction site

A.1.2 Relevant dates for the project activity (e.g., construction, commissioning, continued operation periods, etc.)

The duration of the crediting period corresponding to the monitoring period is covered in this monitoring report. Here the start date of generation has been considered as commissioning date of project.

A.1.3 Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period

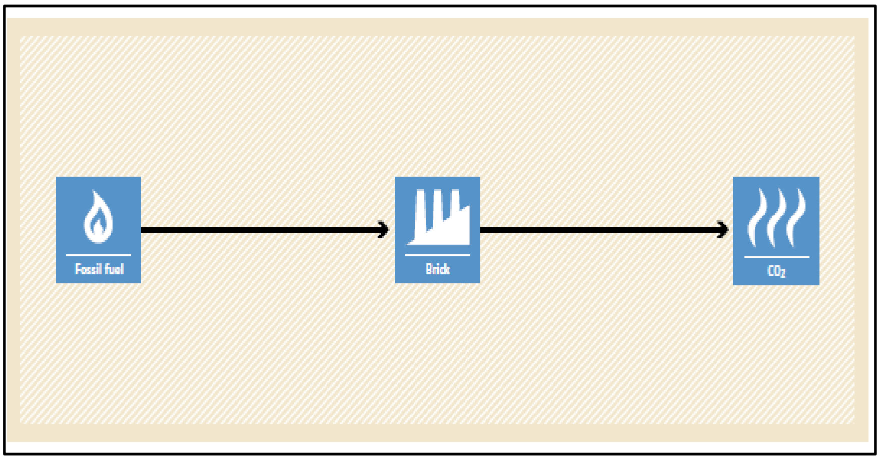
The total GHG emission reductions achieved in this monitoring period are as follows:

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/01/2013
Carbon credits claimed up to	31/12/2021
Total ERs generated (tCO_2e)	478604 tCO_2e
Leakage Emission	303872
Baseline Emission	877039
Project Emission	94563

A 1.4 Baseline Scenario:

Baseline scenario is that the specific energy demand for manufacturing AAC blocks is lower compare to conventional bricks. AAC blocks are being manufactured by the autoclaving process, which is less energy intensive as compared to the thermal baking process used for manufacturing fired clay bricks. Thus, the project activity results in lower GHG emission as compared to the conventional clay bricks manufacturing process.

Baseline Scenario is the brick production using more carbon-intensive fuel and energy – intensive technology.



A.2 Location of Project Activity

Location of project activity

Country : India

State : Gujarat

District : Navsari

Coordinates : 21°02'38.6"N 72°59'10.5"

The representative location map is shown below –

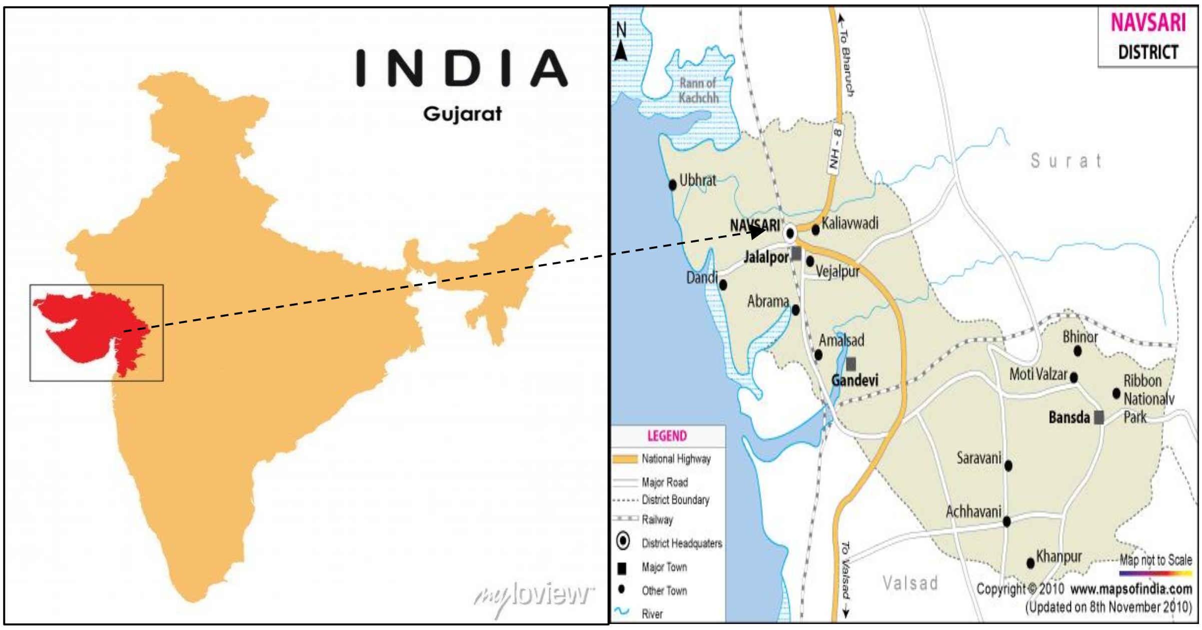


Figure-2- Location of the project activity (courtesy: google images and www.mapofindia.com)

A.3 Parties and project participants

Party (Host)	Participants
India	**Creduce Technologies Private Limited (Aggregator)** **Contact person** : Shailendra Singh Rao **Mobile** : +91 9016850742, 9601378723 **Address** : 2-O-13,14 Housing Board Colony, Banswara, Rajasthan -327001, India **Magicrete Building Solutions Pvt. Ltd. (Project Owner)** Address: Unit No. 401, 4th Floor, Sunil Enclave, Pereira Hill Road, Andheri Kurla Road, Andheri East, Mumbai-400099, Maharashtra, India. Email : info@magicrete.in

A.4 Methodologies and standardized baselines

Sectoral scope : 04, Manufacturing industries

Type : III – other projects

Category : AMS-III.Z.. (Title: "Fuel Switch, process improvement and energy efficiency in brick manufacture", Version 06.0)

A.5 Crediting period of project activity

Start date of the crediting period: 01/01/2013

Crediting period corresponding to this monitoring period: 01/01/2013 to 31/12/2021 (Both dates are inclusive)

A.6 Contact information of responsible persons/entities

Contact person	**:**	**Shailendra Singh Rao**
Mobile	:	+91 9016850742, 9601378723
Address	:	2-O-13,14 Housing Board Colony, Banswara, Rajasthan -327001, India

SECTION - B - Implementation of project activity

B.1 Description of implemented registered project activity

B.1.1 Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN

The project activity crediting period starts from 1st January 2013. There has not been any change in the technology/equipment/design or any other critical factor which may affect GHG emissions associated with this project activity. As mentioned in the previous section, The project focuses on manufacturing Aerated Autoclaved Concrete (AAC) blocks. Raw content used for AAC manufacturing is a mixture of cement, fly ash, sand, water, lime and aluminum powder. AAC blocks are a result of productive use of recycled industrial waste i.e., fly ash from thermal power plant, hence this material can be classified as a sustainable building material. The manufacturing process of AAC blocks involves creating 96 molds during a single 8-hour shift, where the entire process of mixing, cutting, and steam curing occurs. Furnace oil is applied to the molds to facilitate the easy removal of blocks after the curing process. The plant operates for 24 hrs. in total 3 shifts. The raw material data are collected by referencing purchase invoices, the roundtrip distance measured from the supplier's unit to manufacturing unit and all data related to AAC block production is documented in a log book and subsequently updated in the management system.

Production process of AAC blocks does not involve sintering or kiln heating for blocks consolidation and thus completely eliminates the burning of fossil fuels as required in the clay brick production by adopting the green waste mixing technology in PFA slurry process, ultimately contributing to the reduction of greenhouse gas emissions. The estimated annual average and the total CO2e emission reduction by the project activity over the crediting period of 9 years are expected to be 478604 tCO2e

B.1.2 For the description of the installed technology, technical process, and equipment, include diagrams, where appropriate

AAC is a mixture of cement, fly ash, sand, water, limestone and aluminum powder. When the materials are proportionally weighed. AAC is using no aggregate larger than sand. Here, Aluminium powder reacts with calcium hydroxide and water to form H_2. The hydrogen gas foams and doubles the volume of the raw mix creating gas bubbles. At the end of the foaming process, the hydrogen escapes into the atmosphere and is replaced by air. When the air is removed from the material, it is solid but still soft. It is then cut into blocks and placed in a cylindrical chamber for 11-12 hours. During this steam pressure curing process, when the temperature reaches 190° C (374° F) and the pressure reaches to a maximum limit of 12 bar, sand reacts with calcium hydroxide to form calcium silicate hydrate, which gives AAC its high strength and lightweight properties, solid but soft in nature.

B.2 Do no harm or impact test of the project activity

The project activity uses energy efficient technology for production of grade I blocks compared to red bricks. The facility does not produce any pollution in manufacturing process but proposes to use the waste products like flyash, 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 flyash and fossil fuels. It has been envisaged that the project shall contribute to sustainable development using the following ways:

Social well-being: The lightweight nature of AAC blocks enhances safety in construction, further supporting the well-being of workers. The overall positive impact on communities, combined with sustainable practices and a sense of community pride, results in a more resilient and thriving society.

Economic well-being: The manufacturing of AAC (Autoclaved Aerated Concrete) blocks positively influences economic well-being on various fronts. Job creation at different stages of production, from raw material extraction to sales, generates income for individuals and households. This process also fosters the growth of local businesses supplying materials and services. Infrastructure development is spurred by investments in manufacturing facilities, contributing to broader economic benefits.

Technological well-being:

Benefits of using this technology is mentioned below:

- This process is energy efficient
- Lower energy consumption per cum for production process
- AAC blocks are better heat insulation properties
- This process is comparatively non-toxic and environment friendly
- AAC blocks are fire resistant
- Sound absorbent
- No waste of raw material
- AAC blocks are less reactive to natural climate conditions as compared to traditional bricks

Environmental well-being: The project activity utilizes fly ash, which is major waste material from thermal power plants and causes many risks if not disposed properly. The project activity will cause comparatively less air pollution, water pollution or solid waste to the environment which otherwise would have been generated if the traditional technology was used for brick manufacturing. Project activity helps in reduction of fossil fuel combustion, thus helping in keeping environment clean. Also, by using fly ash as the main ingredient for block production it helps reduce the environmental hazard caused due to improper disposal of fly ash and other thermal plant waste products, which are labeled as hazardous substance if not disposed properly. This substance if mixed with water bodies contaminate water and make it harmful for use. The following conditions are applicable to ensure the activity is enviro-friendly:

1. There shall be no nuisance due to project activity in the surroundings
2. The handlings of fly ash i.e., transports, loading and storage shall be done in a scientific manner so as to avoid fugitive emissions and nuisance.
3. Water shall be sprinkled on stored fly ash to avoid fugitive emissions.

The project activity contributes to the following SDGs;

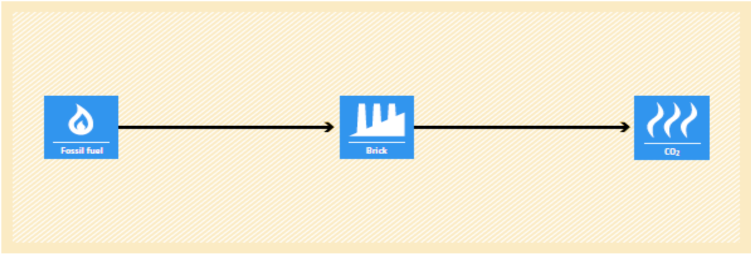
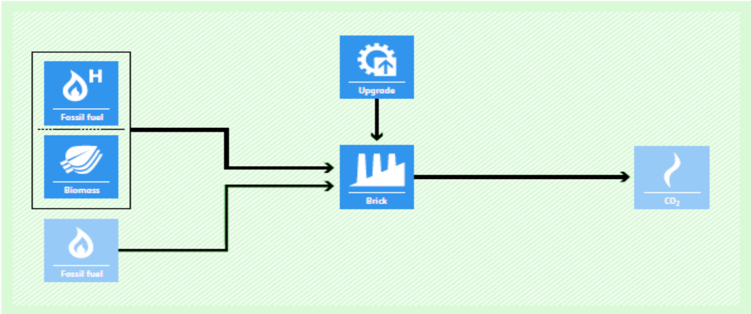
SDG Goals	Description
13 CLIMATE ACTION	• The manufacturing processes of AAC blocks require electricity and steam generation for operation. • The consumption of such forms of energy (electricity/fuel) to generate steam is much lower compared to the thermal energy consumed for the production of burnt clay bricks and hence displaces the carbon-intensive coal/fuel oils. • The project activity will cause comparatively less air pollution, water pollution or solid waste to the environment which otherwise would have been generated if the traditional technology was used for brick manufacturing. Project activity helps in reduction of fossil fuel combustion, thus helping in keeping environment clean. Also, by using fly ash as the main ingredient for block production it helps reduce the environmental hazard caused due to improper disposal of fly ash and other thermal plant waste products, which are labeled as hazardous substance if not disposed properly.
8 DECENT WORK AND ECONOMIC GROWTH	• Since the proposed project activity is a green field project it has created employment opportunities for skilled-unskilled people in the entire project area.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	• Enhancement of the use of green building material: The following are the ecological green building quality and characteristics of AAC blocks: • Energy efficient • Lower energy consumption per cum in production process • Best thermal insulation, 6 to 10 times better than regular concrete • Un-suppressed fire resistance • Excellent sound absorption • No waste of raw materials
11 SUSTAINABLE CITIES AND COMMUNITIES	• AAC blocks are lightweight and provide good insulation, which can lead to more energy-efficient buildings. This contributes to sustainable urban development by reducing the carbon footprint of buildings.
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	• AAC blocks are a sustainable alternative to traditional construction materials. Their production requires fewer raw materials, and they are durable, contributing to responsible consumption and production practices.

B.3 Baseline Emissions

The baseline scenario identified at the MR stage of the project activity is:

The average annual baseline fossil fuel consumption value and the baseline brick production rate shall be determined as that which would have been consumed and produced, respectively, under an appropriate baseline scenario. The schematic diagram below shows the baseline scenario and project scenario”.

BASELINE SCENARIO Brick production using more-carbon-intensive fuel and energy-intensive technology.	
PROJECT SCENARIO Brick production using less-carbon-intensive fuel or biomass in a more-efficient facility.	

B.4. De-bundling

This project activity is not a debundled component of a larger project activity.

SECTION - C - Application of methodologies and standardized baselines

C.1 References to methodologies and standardized baselines

Sectoral scope	:	04, Manufacturing industries
Type	:	III – other projects
Category	:	AMS-III.Z.. (Title: "Fuel Switch, process improvement and energy efficiency in brick manufacture", Version 06.0)

C.2 Applicability of methodologies and standardized baselines

The project activity involves installation of a new technology for brick/block manufacturing which is not a traditional activity in India. This activity leads to reduction of burning of coal, which is a major contributor in Green House Gas (GHG) emission in the environment.

The project activity produces average 3,10,00 m^3 of AAC blocks. The emission reduction is below 60,000 tCO_2e and it will qualify as small-scale project activity under Type-III of the Small-Scale methodology. The project status is corresponding to the methodology AMS-III.Z., Version 06.0 and applicability of methodology is discussed below:

Applicability Criterion	Project Case
1. The measures may replace, modify, retrofit or add capacity to systems in existing facilities or be installed in a new facility.	The project activity is a green field project and no modification, retrofit or capacity addition was done. So, this criterion does not apply to this project activity.

2. The methodology is applicable for the production of: a. Bricks that are the same in the project and baseline cases; or b. Bricks that are different in the project case versus the baseline case due to a change(s) in raw materials, use of different additives, and/or production process changes resulting in reduced use or avoidance of fossil fuels for forming, sintering (firing) or drying or other applications in the facility as long as it can be demonstrated that the service level of the project brick is comparable to that of the baseline brick (see paragraph 11). Examples include pressed mud blocks (soil blocks) with cement or lime stabilization and other 'unburned' bricks that attain strength due to fly ash, lime/cement and gypsum chemistry.	Since this project activity uses completely different raw material and technology for the manufacturing of blocks, Criteria (b) of point 2 applies here.
3. New facilities (Greenfield projects) and project activities involving capacity additions are only eligible if they comply with the requirements for Greenfield projects and capacity increase projects specified in the "General guidelines for SSC CDM methodologies".	This is greenfield project activity complies with the requirements for greenfield project and capacity increase projects specified in the "General guidelines for SSC CDM methodologies".
4. The requirements concerning the demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General guidelines for SSC CDM methodologies". If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e. the time when the affected systems would have been replaced in the absence of the project activity	No replacement of old equipment is done, so this criterion does not apply to the project activity.
5. For existing facilities, it shall be demonstrated, with historical data, that for at least three years immediately prior to the start date of the project implementation, only fossil fuels or NRB (non-renewable biomass) were used in the brick production systems that are being modified or retrofitted. In cases where small quantities of renewable biomass were used for experimental purposes this can be excluded.).	This is a Greenfield project activity, so this criterion does not apply.

6. The renewable biomass utilized by the project activity shall not be chemically processed (e.g. esterification to produce biodiesel, degumming and/or neutralization by chemical reagents) prior to the combustion but it may be processed mechanically (e.g. pressing, filtering) and/or thermally (e.g. gasification to produce syngas).	This criterion is not applicable as there was no biomass utilized by the project activity.
7. In cases where the project activity utilizes charcoal produced from renewable biomass as fuel, the methodology is applicable provided that: (a) Charcoal is produced in kilns equipped with a methane recovery and destruction facility; or (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. A default value of 0.030 t CH4/t charcoal may be used in accordance with “AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption”; (c) If charcoal is produced from other CDM project activities, it shall be ensured that no double counting of the emission reductions occurs.	The project activity utilizes the charcoal and it is of negligible quantity compared to coal used in the boiler hence this criterion is not applicable however methane emission generated from the combustion of charcoal is included in the project emission.

8. In the case of project activities involving changes in raw materials (including additives), it shall be demonstrated that additive materials are abundant in the country/region, according to the following procedures: (a) Step 1: using relevant literature and/or interviews with experts, a list of raw materials to be utilized is prepared based on the historic and/or present consumption of such raw materials; (b) Step 2: the current supply situation for each type of raw material to be utilized is assessed and their surplus availability is demonstrated using one of the approaches below: (i) Approach 1: demonstrate that the raw materials to be utilized, in the region of the project activity, are not fully utilized. For this purpose, demonstrate that the quantity of material is at least 25 per cent greater than the demand for such materials or the availability of alternative materials for at least one year prior to the project implementation; (ii) Approach 2: demonstrate that suppliers of the raw materials to be utilized, in the region of the project activity, are not able to sell all of their supply of these materials. For this purpose, project participants shall demonstrate that a representative sample of suppliers of the raw materials to be utilized, in the region, had a surplus of materials (e.g., at the end of the period during which the raw material is sold) that they could not sell and that is not utilized.	The project activity's raw material requirements include Fly-ash, Lime, Gypsum, Cement and Aluminium. Fly ash is a waste product, gypsum is a by-product but used in very small quantities, whereas lime, cement and Aluminium are industrial products. The project activity uses around 70 wt.% of the fly ash. Being a byproduct of coal-based thermal power plants with annual generation of millions of tons, fly ash is abundantly available within a feasible distance from the plant. Step 2/Approach 1: As per the "REPORT ON FLY ASH GENERATION AT COAL / LIGNITE BASED THERMAL POWER STATIONS AND ITS UTILIZATION IN THE COUNTRY FOR THE YEAR 2021 – 22" (https://cea.nic.in/wp-content/uploads/tcd/2022/08/Fly_ash_Generation_and_utilisation_Report_2021_22-1.pdf) page 54, TABLE-XIX shows that in the year 2007-08 (one year prior to the project implementation) around 117 million tons of fly ash generated and only 53% were utilized. Thus, it may be concluded that fly ash is available in abundance and the project activity meets the applicability criterion.

<table>
<tr>
<td rowspan="5">9. This methodology is applicable under the following conditions:

(a) The service level of project brick shall be comparable to or better than the baseline brick, i.e., the bricks produced in the brick production facility during the crediting period shall meet or exceed the performance level of the baseline bricks (in terms of, for example dry compressive strength, wet compressive strength, density). An appropriate national standard shall be used to identify the strength class of the bricks; bricks that have compressive strengths lower than the lowest class bricks in the standard are not eligible under this methodology. Project bricks are tested in nationally approved laboratories at six-month intervals (at a minimum) and test certificates on compressive strength are made available for verification;

(b) The existing facilities involving modification and/or replacement shall not influence the production capacity beyond ±10 per cent of the baseline capacity unless it is demonstrated that the baseline for the added capacity is the same as that for the existing capacity in accordance with paragraph 5 above;

(c) Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.</td>
<td colspan="3">Since the AAC blocks are better than traditional red clay bricks (as shown above) and measures of CO_2 emission reduction is less than 60kt CO_2 and as no capacity addition is done to the plant and this a greenfield project.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Baseline</td>
<td>Project</td>
</tr>
<tr>
<td>Density (kg/m^3)</td>
<td>1600-1800</td>
<td>604</td>
</tr>
<tr>
<td>Dry Compressive Strength (Mpa)</td>
<td>3.5</td>
<td>4.26</td>
</tr>
<tr>
<td colspan="3">(b- https://doi.org/10.1016/j.matpr.2021.06.061)

Therefore, only point (a) is applicable to this criterion.

For criteria c) as per UCR applicable deviation permitted – Measure can exceed emission reductions over 60kt CO_2 equivalent annually.

The project activity is not a replacement or retrofit to an existing facility. The project activity is being implemented as a new facility (Greenfield project). Thus, the criterion (b) is not applicable.</td>
</tr>
<tr>
<td>10. This methodology is not applicable if local regulations require the use of the proposed technologies or raw materials for the manufacturing of bricks unless widespread non-compliance (i.e., less than 50 per cent of brick production activities in the country comply) of the local regulation evidenced.</td>
<td colspan="3">There are no such regulations which make it mandatory for the use of this technology in the region and Project proponent use this technology voluntary, therefor this criterion does not apply to the project activity.</td>
</tr>
</table>

11. In cases where the project activity utilizes biomass sourced from dedicated plantations, applicability conditions prescribed in the tool “Project emissions from cultivation of biomass” shall apply. If the project activity involves reducing the NRB consumption, project participants shall demonstrate that NRB has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	This criterion is not applicable.
12. The following cases are exempted from ‘determining the occurrence of debundling’ as per the “Guidelines on assessment of debundling for SSC project activities”: (a) Project activities that aggregate brick units with holistic production cycles i.e., from raw material procurement to finished product, where each unit is not larger than 5 per cent of the Type III small-scale CDM project activity thresholds i.e. 3,000 t CO2e; or (b) Project activities that aggregate brick units, where each unit qualifies as Type III microscale CDM project activity and the geographic location of the project activity is a least developed countries/small island developing states (LDC)/(SIDS) or special underdeveloped zone (SUZ) of the host country as identified by the government in accordance with the guideline on “Demonstrating additionality of microscale project activities”.	This criterion is not applicable.

C.3 Applicability of double counting emission reductions

The project was not applied under any other GHG mechanism. Hence the project will not cause double accounting of carbon credits (i.e., CoUs).

C.4 Project boundary, sources, and greenhouse gases (GHGs)

The project boundary is the physical, geographical site where the brick production takes place during both the baseline and crediting periods, NEWNE grid and source of raw materials.

Table-1- Project and baseline emission

Source		Gas	Included?	Justification/Explanation
Baseline	Fossil fuel combustion in red clay brick kiln	CO_2	Yes	Main source of emission
		CH_4	No	Not considered which is conservative
		N_2O	No	Not considered which is conservative
Project	Electricity consumption for operating plant machinery	CO_2	Yes	Main source of emission
		CH_4	Yes	Minor source of emission
		N_2O	No	Neglected for simplicity
Leakage	GHG emissions during raw material production	CO_2	Yes	Main source of emission
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
	GHG emissions during raw material transportation	CO_2	Yes	Main source of emission
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity

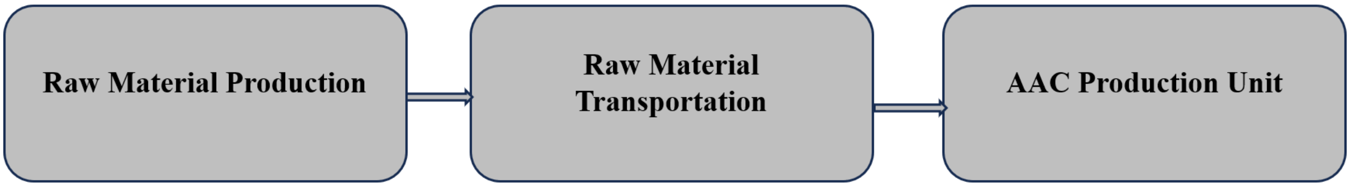


Figure -3 - Project Boundary

C.5 Establishment and description of the baseline scenario

The Simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced by process improvement and energy efficiency in brick manufacture.

C.5.1 Net GHG Emission Reductions and Removals

Thus, $ER_y = BE_y – PE_y – LE_y$

Where:

ER_y = Emission reductions in year y (tCO_2/y)

BE_y = Baseline Emissions in year y ($t\ CO_2/y$)

PE_y = Project emissions in year y (tCO_2/y)

LE_y = Leakage emissions in year y (tCO_2/y)

- ***Baseline Emissions***

a) Baseline emissions for Fuel Switch, process improvement and energy efficiency in brick manufacture is calculated as below

The baseline emissions are the fossil fuel and NRB consumption related emissions associated with the system(s), which were or would have otherwise been used, in the brick production facility(ies) in the absence of the project activity:

$BE_y = SEC_{BL} \times EF_{BL} \times P_{PJ,y}$ **Equation (1)**

Where:

BE_y	=	The annual baseline emissions from fossil fuels or NRB displacedby the project activity in t CO_2e in year y (of the crediting period)
SEC_{BL}	=	Specific energy consumption of brick production in the baseline,TJ per unit volume or mass unit (kg or m^3)
EF_{BL}	=	The emission factor of baseline fuel(s), in t CO_2/TJ
$P_{PJ,y}$	=	The annual net production of the facility in year y, in kg or m^3

The specific energy consumption (SEC_{BL}) and the emission factor of the baseline fuel(s) (EF_{BL}) shall be calculated ex-ante for project activities that involve replacing, modifying or retrofitting systems in existing facilities as follows:

$$EF_{BL} = \frac{\sum_{j,i}\left(FC_{BL,i,j} \times NCV_j \times EF_{CO_2,j}\right)}{\sum_{j,i}\left(FC_{BL,i,j} \times NCV_j\right)} \quad \textbf{Equation (2)}$$

$$SEC_{BL} = \frac{\sum_{j,i}\left(FC_{BL,i,j} \times NCV_j\right)}{P_{Hy}} \quad \textbf{Equation (3)}$$

Where:

$FC_{BL,i,j}$	=	Average annual baseline fossil fuel or NRB consumption value for fuel type j combusted in the process i, using volume or weight units (kg or m^3). In the case of NRB, it is determined by the total woody biomass consumption multiplied with the fraction of the NRB (fNRB).
NCV_j	=	Average net calorific value of fuel type j combusted, TJ per unit volume or mass unit (kg or m^3). In the case of NRB, the IPCC default for wood fuel, 1.5x10-5 TJ/kg based on the gross weight of the wood that is 'air-dried', shall be used.

$EFCO_{2,j}$	=	CO_2 emission factor of fuel type j combusted in the process i in t CO_2/TJ. In the case of NRB, a default value of 81.6 t CO2/TJ is used, i.e. the emission factor for the fossil fuels projected to be used for substitution of NRB by similar consumers.
PH_y	=	Average annual historical baseline brick production rate in accordance with paragraph 19(a), in units of weight or volume, kg or m^3.

From the literature (https://doi.org/10.1016/j.enbuild.2014.10.042), the embodied energy associated with the fire brick is estimated at around 2.2 MJ/kg and considering the conservative density of 1600 kg/m^3 and coal emission factor of 96.1 tCO_2e/TJ, the emission factor of baseline brick is ;

= 2.2 x 1600 x 10^{-6} x 96.1

= 0.338272 tCO_2e/m^3

Estimated baseline emission (BE) reductions for the monitoring period is -

BE = 877039 tCO_2e

- ***Project Emissions***

Project emissions shall be calculated using the following equation:

$$E_y = PE_{elec,y} + PE_{fuel,y} + PE_{cultivation,y} + PE_{CH4,y} \qquad \textbf{quation (4)}$$

Where –

PE_y	=	Project emissions in year *y* (tCO_2e)
$PE_{elec,y}$	=	Project emissions due to electricity consumption in year *y* (tCO_2e)
$PE_{fuel,y}$	=	Project emissions due to fossil fuel or NRB consumption in year *y* (tCO_2e)
$PE_{cultivation,y}$	=	Project emissions from cultivation of biomass in a dedicated plantation in year *y* (tCO_2e)
$PE_{CH4,y}$	=	Project emissions due to the production of charcoal in kilns not equipped with a methane recovery and destruction facility in year *y* (tCO_2e)

Project emission for this activity can we calculated by calculating following steps.

a) Emissions from electricity consumption ($PE_{elec,y}$)

The emissions include electricity consumption (including auxiliary use) $PE_{elec,y}$ associated with the biomass treatment and processing, calculated as per the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”.

Here the electricity is drawn from the national grid.

For the calculation of $\boldsymbol{PE_{elec}}$,

$PE_{EC,y} = \sum EC_{PJ,y} \times EF_{EF}$

$PE_{\text{EC},y}$	=	Project emissions due to electricity consumption in year y (tCO_2e)
$EC_{PJ,y}$	=	Quantity of electricity consumed by the project electricity consumption in year y (MWh/yr)
$EF_{EF,}$	=	Emission factor for electricity generation in year y (t CO2/MWh)

Total PE from electricity consumption for monitoring period is = 14507 tCO_2e

b) Emissions from fossil fuel consumption ($PE_{fuel,y}$)

The emissions include fossil fuel or NRB consumption (including auxiliary use) $PE_{fuel,y}$ associated with the operation of the manufacturing process and the biomass treatment and processing. In the case of fossil fuels, it is calculated as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". In the case of NRB, it is calculated by multiplying the quantity of NRB consumption during the project with its NCV and EF, which are the same as in Equation (2) above.

The project activity operates coal-based boiler for the production of steam and consists of two DG sets of capacity 320 and 400 kVA.

Project emission due to fuel consumption is calculated as followed -

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

Where –

$PE_{\text{FC},y}$	=	Project emissions due to fuel consumption in year y (tCO_2e)
$FC_{i,j,y}$	=	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 CO2 emission coefficient of fuel type i in year y (tCO2/mass or volume unit)

Total PE from fossil fuel consumption for monitoring period from 01/01/2013 to 31/12/2021 is = 80056 tCO_2e

c) Emissions associated with biomass and biomass residues cultivation ($PE_{cultivation,y}$)

In cases where the project activity utilizes biomass sourced from dedicated plantations, the project emissions from biomass cultivation shall be calculated according to the methodological tool "Project and leakage emissions from biomass".

The project activity does not use biomass and hence $\boldsymbol{PE_{cultivation,y}} = 0$

d) Emissions from burning of charcoal ($PE_{CH4,y}$)

The methane emission associated with the burning of charcoal is already included in the project emission in tCO_2e

Project Emission = $PE_{elec} + PE_{fuel}$

Total Project emission for the monitoring period of 01/01/2013 to 31/12/2021 is

= **94,563 tCO_2 e**

- ***Leakage Emission***

In the case of project activities involving a change in the production process or a change in the type or quantity of raw and/or additive materials as compared to the baseline, the incremental emissions associated with the production/consumption and transport of those raw and/or additive materials consumed as compared to baseline, shall be calculated as leakage.

As per the methodology, the project activity entails two types of leakage due to changes in the production process which leads to changes in the type and quantity of raw and/or additive materials as compared to the baseline

Emissions associated with the consumption of raw and/or additive materials.

Emissions associated with the transportation of raw and/or additive materials.

$\mathbf{LE_y = LE_{rm,prod,y} + LE_{TR,m}}$

Where,

LE_y	:	Leakage emissions associated with consumption and transport of raw and/or additive materials in the year y.
$LE_{rm,prod,y}$	:	Leakage emissions associated with consumption of raw and/or additive materials in the year y
$LE_{TR,m}$	:	Leakage emission associated with transportation of raw and/or additive materials in the year y

Leakage emission associated with consumption of raw and/or additive materials:

Aluminum Powder & Gypsum are used to produce AAC block in very lower amounts. In this project cement and lime are two major inputs with significant emissions during their production; the fraction of the contribution of Aluminum Powder & Gypsum in per Cum AAC Block production is very lower. However, the Leakage due to the Aluminum Powder production has been considered as a conservative approach.

a) Leakage emission due to raw material consumption

$$LE_{rm,prod,y} = Q_{cement,y} \times EF_{cement} + Q_{lime,y} \times EF_{lime} + Q_{Aluminium,y} \times EF_{Aluminium}$$

Where,

$LE_{rm,prod,y}$: Leakage emissions associated with consumption of raw and/or additive materials in the year y

$Q_{cement,y}$: Quantity of cement consumed for the production of AAC blocks/panels in the year y

EF_{cement} : CO_2 emission factor of the cement production

$Q_{lime,y}$: Quantity of lime consumed for the production of AAC blocks/panels in the year y

EF_{lime} : CO_2 emission factor of the lime production

$Q_{Aluminium,y}$: Quantity of Aluminium Powder consumed for the production of AAC blocks/panels in the year y.

$EF_{Aluminium}$: CO_2 emission factor of the Aluminium production

Total LE from raw material consumption for monitoring period is 2,65,719 tCO_2e

b) Leakage emission due to raw material transportation:

As per the methodological tool "Project and leakage emissions from the road transportation of freight" Version 01 the emissions due to the raw material transportation can be calculated as below:

$LE_{TR,m} = \Sigma D_{fm} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6}$

Where,

$LE_{TR,m}$: Leakage emission from road transportation of freight monitoring period m (tCO_2)

D_{fm} : Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m (km)

$FR_{f,m}$: Total mass of freight transported in freight transportation activity f in monitoring period m (t)

$EF_{CO2,f}$: Default CO_2 emission factor for freight transportation activity f (gCO_2 / t km)

For the calculation of the leakage emission, the farthest supplier is the conservative choice for determining the round trip distance.

Total LE from raw material transportation for monitoring period is **-** 38,153 tCO_2e

LE= 38153 + 265719 = 303872 tCO_2e

<u>Estimated Net GHG Emission Reductions and Removals</u>

Year	Baseline emissions	Project emissions	Leakage emissions	Net emission
2013	77078	9707	43702	23669
2014	71460	9248	34815	27397
2015	107726	9485	37303	60938
2016	92518	8113	32001	52404
2017	98175	11134	26038	61003
2018	121149	14247	36168	70734
2019	108330	11732	35110	61,448
2020	80586	9184	25001	46401
2021	120017	11713	33734	74570
Total	**877039**	**94563**	**303872**	**478604**

ER = 877039- 94563 - 303872 = 478604 tCO_2e

Thus, as per the calculations the project will displace heat generation from coal consumption leading to an emission reduction of 478,604 tCO_2e equivalent for the period of 01/01/2013 to 31/12/2021. In the absence of the proposed project activity, the steam demand would have been supplied to the processing plants by the coal-based boiler.

C.6 Prior History

The project was not applied under any other GHG mechanism. Hence the project will not cause double accounting of carbon credits (i.e., CoUs).

C.7 Changes to the start date of crediting

The start date of crediting under UCR is 01/01/2013.

First Monitoring Period: 9 Years and 00 Months

01/01/2013 to 31/12/2021 (inclusive of both dates)

C.8 Permanent changes from MR monitoring plan, applied methodology, or applied standardized baseline

As per CDM methodology AMS-III.Z.: "Fuel Switch, process improvement and energy efficiency in brick manufacture", Version 06.0. Section 11: Clause c) "Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually".

This project exceeds the cap of 60kt/yr CO_2 annually for the following vintage years 2015,2017,2018 2019 and 2021. Hence according to the applicable deviation permitted by UCR –

Section -11: Clause c) Measure can exceed emission reductions over 60kt CO_2 equivalent annually.

https://medium.com/@UniversalCarbonRegistry/methodology-deviation-notification-36dc14eaee24

C.9 Monitoring period number and duration

Total Monitoring Period: 9 Years 0 Months

Date: 01/01/2013 to 31/12/2021 (inclusive of both dates).

C.10 Monitoring Plan

Tests will be conducted to validate that the project bricks meet the performance requirements and specifications in line with the following sampling plan which includes the following information:

To validate that the level of the manufactured product is better than that of the baseline product, PP will check the lab testing report having the mean value of the dry compressive strength of the project activity output at six-month intervals during the crediting period and with a 90/10 confidence. The product that does not match the necessary compressive strength requirements will be excluded from production.

The simple random sampling method will be used during site monitoring. Simple random sampling is suited to populations that are homogeneous. Since the AAC Blocks are manufactured through a fixed composition the output is homogenous in nature. The sample size calculations are based on a proportion (or percentage) of interest being the objective of the project, under Simple random sampling method.

Data and parameter to be monitored is given in below tables:

Data / Parameter	EF_{grid}
Data unit	tCO_2/MWh
Description	UCR recommended emission factor As per UCR CoU Standard Aug 2022 (Updated Ver.6), Clause – Emission Factors "The UCR recommends an emission factor of 0.9 tCO2/MWh for the 2013-2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Emission factors for the post 2020 period are to be selected as the most conservative estimate

	between the national electricity/power authority published data set and UCR default of 0.9 tCO2/MWh.”
Source of data	*UCR CoU Standard Aug 2022 (Updated Ver.6)* https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf
Value applied	0.9
Justification of choice ofdata or description of measurement methods and procedures applied	The UCR suggested emission factor is a conservative choice.
Purpose of Data	Calculation of project emissions associated with utilization of electricity
Comments	The value is fixed ex-ante

Data / Parameter	**EF_{BL}**
Data unit	tCO_2e/m^3
Description	The parameter is Annual production specific emission factor for manufacturing the product derived in the baseline scenario to project activity product.
Source of data	The calculation of baseline emission of fire bricks is derived from the literature considering the embodied energy associated with red brick manufacturing and conservative density. Reference; 1. Praseeda, K. I., BV Venkatarama Reddy, and Monto Mani. "Embodied energy assessment of building materials in India using process and input–output analysis." *Energy and Buildings* 86 (2015): 677-686. https://www.sciencedirect.com/science/article/abs/pii/S0378778814008871 2. Levi, K. Paul, and Ashwin Raut. "Embodied energy analysis to understand environmental impact of brick

	industry in West Godavari region." Materials Today: Proceedings 47 (2021): 5338-5344.
Value applied	0.338272
Justification of choice ofdata or description of measurement methods and procedures applied	The baseline annual production specific emission factor considers only the energy component associated to coal consumption.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	**EF_{cement}**
Data unit	tCO_2e/Ton of cement
Description	Carbon emission factor of Cement production
Source of data	https://www.wbcsd.org/Sector-Projects/Cement-Sustainability-Initiative/News/Indian-cement-industry-on-track-to-meet-2030-carbon-emissions-intensity-reduction-objectives
Value applied	0.67
Justification of choice ofdata or description of measurement methods and procedures applied	CSI Protocol is an authentic source of data.
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	**$EF_{Aluminium}$**

Data unit	tCO_2e/Ton of Aluminium
Description	Carbon emission factor of Aluminium powder production
Source of data	Table 17: Industrial processes-emission factors and activity data, Pg 23. https://www.globalbioenergy.org/uploads/media/0801_Australia_-_National_Greenhouse_Accounts__NGA__factors.pdf
Value applied	1.89
Justification of choice ofdata or description of measurement methods and procedures applied	IPCC 2006 refers to emission factor of 1.7 tCO2/t of Aluminium; However National Greenhouse Accounts (NGA) Factors, Table 17: Industrial processes- emission factors and activity data takes into consideration CO2 emissions and CF4 and C2F6 emissions dueto production of aluminium. The NGA factors have been taken to be on a conservative side.
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	$\mathbf{EF_{Lime}}$
Data unit	tCO_2e/Ton of Lime
Description	Carbon emission factor of Lime ($CaCO_3$) production
Source of data	2006 IPCC, Volume 3 Chapter 2: MINERAL INDUSTRY EMISSIONS, Equation 2.8 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_2_Ch2_Mineral_Industry.pdf
Value applied	0.7
Justification of choice ofdata or description of measurement methods and procedures applied	
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	**EF_{gypsum}**
Data unit	tCO_2e/Ton of gypsum
Description	Carbon emission factor of gypsum production
Source of data	Page 85 of Methodology for the free allocation of emission allowances in the EU ETS post 2012, Chapter 4 Benchmark Values https://climate.ec.europa.eu/system/files/2016-11/bm_study-project_approach_and_general_issues_en.pdf
Value applied	0.01
Justification of choice ofdata or description of measurement methods and procedures applied	
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	**EF_{POP}**
Data unit	tCO_2e/Ton of POP
Description	Carbon emission factor of plaster of paris
Source of data	Under Chapter 4 Benchmark Values – Pg 13 https://climate.ec.europa.eu/system/files/2016-11/bm_study-project_approach_and_general_issues_en.pdf
Value applied	0.05
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	**$EFCO_{2,t}$**
Data unit	g tCO_2e/Ton Km
Description	Default carbon di-oxide emission factor for freight transport activity f
Source of data	Based on the methodological tool "Project and leakage emissionsfrom road transportation of freight."(Version 01.0.0)
Value applied	**Vehicle Class** / **Emission factor (gCO_2/t Km)** Light vehicle: **245** Heavy vehicle: **129** For raw material (Fly ash, Gypsum, Cement, Lime, Aluminium Powder) transportation generally heavy vehicles are being used. So PP has considered the values for emission factor of Heavy vehicles.
Justification of choice of data or description of measurement methods and procedures applied	The choice of heavy vehicle emission factor is fixed ex-ante as per the weighbridge receipt of each transportation vehicle weighed more than 26 ton.
Purpose of Data	Calculation of leakage emissions
Comments	The value is fixed ex-ante

Data / Parameter	**NCV_{Diesel}**
Data unit	TJ/Gg
Description	Net calorific value of fossil fuel used in year y
Source of data	Page - 18 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	43

Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC has been considered.
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$EF_{CO2,diesel}$
Data unit	tCO_2/TJ
Description	Diesel emission factor
Source of data	Page no. 18 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf
Value applied	74.1
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC has been considered.
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante.
Data / Parameter	EF_{Coal}
Data unit	tCO_2/TJ
Description	Emission factor of diesel
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Page no. 16, Table 2.2 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Value applied	101
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC has been considered
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante

Data / Parameter	$\mathbf{EF_{FO}}$
Data unit	tCO_2/TJ
Description	Furnace oil emission factor
Source of data	Page no. 18 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf
Value applied	77.4
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC has been considered.
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$\mathbf{NCV_{FO}}$
Data unit	TJ/Gg
Description	Net Calorific value of Furnace oil
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 – Energy, Table 1.2, Pg 18.

	https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	40.4
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC has been considered.
Purpose of Data	Calculation of project emission
Comments	The value is fixed ex-ante.

Data and parameters to be monitored;

Data / Parameter	$P_{PJ, y}$
Data unit	m^3
Description	Yearly production capacity
Source of data	Data from logbook and management system
Value applied	(see table below)

Year	Production (m^3)	Year	Production (m^3)
2013	2,27,860	2018	3,58,144
2014	2,11,252	2019	3,20,246
2015	3,18,462	2020	2,38,229
2016	2,73,505	2021	3,54,796
2017	2,90,225		

Justification of choice of data or description of measurement methods and procedures applied	A total of 96 moulds for AAC blocks are manufactured during a single shift, with each shift lasting 8 hours. There are three shifts conducted in a day. The information regarding AAC block production is recorded in a logbook and subsequently updated in the management system.
Purpose of Data	Calculation of baseline and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	Q_{cement}
Data unit	Ton
Description	Ton of cement used during the monitoring period
Source of data	Purchase invoice and weighbridge receipts
Value applied	2,26,467
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	Q_{lime}
Data unit	Ton
Description	Ton of lime used during the monitoring period
Source of data	Purchase invoice and weighbridge receipts

Value applied	1,48,805
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$Q_{aluminium}$
Data unit	Ton
Description	Ton of aluminium used during the monitoring period
Source of data	Purchase invoice and weighbridge receipts
Value applied	1,117
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	Q_{POP}
Data unit	Ton
Description	Ton of POP used during the monitoring period

Source of data	Purchase invoice and weighbridge receipts
Value applied	4,577
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	Q_{gypsum}
Data unit	Ton
Description	Ton of gypsum used during the monitoring period
Source of data	Purchase invoice and weighbridge receipts
Value applied	3,699
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	Q_{flyash}
Data unit	Ton

Description	Ton of flyash used during the monitoring period
Source of data	Purchase invoice and weighbridge receipts
Value applied	12,78,564
Justification of choice of data or description of measurement methods and procedures applied	Continuous monitoring, daily and monthly recording of data in logbook and management system.
Purpose of Data	Calculation of leakage and project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$D_{f,m, flyash}$
Data unit	Km
Description	Return trip road distance between the origin and destination of fly ash transportation activity f in monitoring period m
Source of data	The distance is measured by the coordinates provided of manufacturing unit to that of suppliers.
Value applied	156.8
Justification of choice of data or description of measurement methods and procedures applied	Number of trips aggregated monthly

QA/QC procedures to be applied	The data should be recorded in Log book (Per trip of incoming of raw material) & it would be cross-checked through the invoiced/Challan provided by the supplier or Vendors. The PP will note down the starting kilometer reading from the source of raw material and final kilometer reading while entering in the premises of the factory gate.
Purpose of Data	Calculation of leakage emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$D_{f,m,\ gypsm\ \&\ POP}$
Data unit	Km
Description	Return trip road distance between the origin and destination of gypsum and POP transportation activity f in monitoring period m
Source of data	The distance is measured by the coordinates provided of manufacturing unit to that of suppliers.
Value applied	1190
Justification of choice of data or description of measurement methods and procedures applied	Number of trips aggregated monthly
QA/QC procedures to be applied	The data should be recorded in Log book (Per trip of incoming of raw material) & it would be cross-checked through the invoiced/Challan provided by the supplier or Vendors. The PP will note down the starting kilometer reading from the source of raw material and final kilometer reading while entering in the premises of the factory gate.
Purpose of Data	Calculation of leakage emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$D_{f,m}$ **cement**
Data unit	Km
Description	Return trip road distance between the origin and destination of cement transportation activity f in monitoring period m
Source of data	Records of vehicle operator or records by project participants, Purchase invoice and weighbridge receipts
Value applied	1108
Justification of choice of data or description of measurement methods and procedures applied	Number of trips aggregated monthly
QA/QC procedures to be applied	The data should be recorded in Log book (Per trip of incoming of raw material) & it would be cross-checked through the invoiced/Challan provided by the supplier or Vendors. The PP will note down the starting kilometer reading from the source of raw material and final kilometer reading while entering in the premises of the factory gate.
Purpose of Data	Calculation of leakage emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$D_{f,m}$ **lime**
Data unit	Km
Description	Return trip road distance between the origin and destination of lime transportation activity f in monitoring period m
Source of data	The distance is measured by the coordinates provided of manufacturing unit to that of suppliers.

Value applied	1648
Justification of choice of data or description of measurement methods and procedures applied	Number of trips aggregated monthly
QA/QC procedures to be applied	The data should be recorded in Log book (Per trip of incoming of raw material) & it would be cross-checked through the invoiced/Challan provided by the supplier or Vendors. The PP will note down the starting kilometer reading from the source of raw material and final kilometer reading while entering in the premises of the factory gate.
Purpose of Data	Calculation of leakage emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	$D_{f,m\ Aluminium}$
Data unit	Km
Description	Return trip road distance between the origin and destination of aluminium transportation activity f in monitoring period m
Source of data	The distance is measured by the coordinates provided of manufacturing unit to that of suppliers.
Value applied	1589
Justification of choice of data or description of measurement methods and procedures applied	Number of trips aggregated monthly
QA/QC procedures to be applied	The data should be recorded in Log book (Per trip of incoming of raw material) & it would be cross-checked through the invoiced/Challan provided by the supplier or Vendors. The PP will note down the starting kilometer reading from the source

	of raw material and final kilometer reading while entering in the premises of the factory gate.
Purpose of Data	Calculation of leakage emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	FC_{diesel}
Data unit	L
Description	Quantity of fuel type (diesel) combusted in DG sets during the monitoring period
Source of data	Fuel purchase invoices and logbook
Value applied	2524.29
Justification of choice of data or description of measurement methods and procedures applied	The data is recorded in Logbook for each fill & aggregated on a monthly basis. The same is cross-checked through the invoiced/purchase receipts and opening and closing stocks of diesel.
QA/QC procedures to be applied	-
Purpose of Data	Calculation of the project emission
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

ANNEXURE I (Raw Material)

Raw material consumption during project activity									
Raw material (tons)	**2,013**	**2,014**	**2,015**	**2,016**	**2,017**	**2,018**	**2,019**	**2,020**	**2,021**
Aluminium Powder	126	115	124	109	116	146	131	99	151
Cement	38,701	28,837	28,270	25,003	14,700	26,125	25,820	18,473	20,538
Lime	17,125	14,813	17,438	14,573	16,222	18,496	17,649	12,509	19,980
Gypsum	1,568	1,233	0	675	187	19	12	5	0
POP	0	721	2,429	1,245	16	72	69	2	24
Ash	1,46,369	1,29,376	1,52,266	1,26,348	1,30,012	1,55,604	1,37,407	1,15,317	1,85,865

ANNEXURE II (Fuel Consumption)

Fuel Consumption (tonne)									
Fossil Fuel	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Furnace Oil	100	108	117	100	94	121	89	81	124
Lignite	208	117	0	261	3067	5242	3175	1249	3420
Diesel	135	973	88	74	89	70	118	51	67

ANNEXURE III (Electricity Consumption)

Electricity Consumption during project acitivity									
EC (MWh)	2013	2014	2015	2016	2017	2018	2019	2020	2021
	1454.5	1348.48	2032.84	1745.86	1852.59	2286.14	2044.25	1382.65	1966.56