# MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT

**Title: Renewable Biomass Based Thermal Energy Generation By Bhani Agro India Pvt Ltd, Wazirpur, UP**

Version 1.0
Date of MR: 03/10/2022
First CoU Issuance Period: 1 Years, 0 Months
Crediting Period: 18/01/2021 to 31/12/2021
Monitoring Period: 18/01/2021 to 31/12/2021 (both days included)
UCR PROJECT ID: 187

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

| BASIC INFORMATION | |
|---|---|
| Title of the project activity | **Renewable Biomass Based Thermal Energy Generation By Bhani Agro India Pvt Ltd, Wazirpur, UP** |
| Scale of the project activity | Small Scale |
| UCR PROJECT ID | 187 |
| Completion date of the MR | 03/10/2022 |
| Project participants | Project Proponent: Bhani Agro India Pvt Ltd<br>Aggregator: Ozone Envirotech Private limited |
| Host Party | India |
| Applied methodologies and standardized baselines | **CDM UNFCCC Methodology**<br>**AMS-I.C**.: Thermal energy production with or without electricity (Ver.21.0) |
| Sectoral scopes | 01 Energy industries (Renewable/NonRenewable Sources) |
| Calculated amount of annual average GHG emission reductions | 2021: 26624 $tCO_2$ (26624 CoUs) |
| Calculated total GHG emission reductions for this crediting period | **26624 $tCO_2$ (26624 CoUs)** |

## SECTION A. Description of project activity

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

The project **Renewable Biomass Based Thermal Energy Generation By Bhani Agro India Pvt Ltd, Wazirpur, UP** is located at Malhipur Road, Village: Wazirpur, District: Bahraich State: Uttar Pradesh, Country: India.

The details of the registered project are as follows:

**Purpose of the project activity:**

The project activity by Bhani Agro India Pvt Ltd (BAIPL) a rice mill manufacturing facility, involves the installation of a 14 TPH biomass (rice husk) based boiler. The primary technology for the project activity involves direct combustion of carbon neutral biomass fuel in the boiler to generate thermal energy. During combustion chemical energy contained in the biomass is converted into thermal energy, which is utilized for steam/hot air generation. The boiler of 14 TPH capacity has outlet parameters of 10.54 $kg/cm^2$ (pressure) and 180 ºC (temperature). The boiler was first steam tested on 09/11/2020 which is taken as the commissioning date of the project activity. However, actual production at the project activity began on 18/01/2021.

The project activity is the thermal energy production using renewable energy sources that displaces fossil fuel use and avoids GHG emissions ($CO_2$). In the pre-project scenario, the process demand of steam would have been met by a coal fired boiler. The project results in reductions of $CO_2$ emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

## A.2. Location of project activity >>

Country: India
Site: Malhipur Road,
Village: Wazirpur
District: Bahraich
State: Uttar Pradesh (U.P.)
Latitude: 27° 37' 23.88" N
Longitude: 81° 39' 13.968" E


## A.3. Technologies/measures>>

The project activity is the installation of a biomass (rice husk) fired boiler for steam generation. The generated steam is utilized for meeting the process requirement. In the baseline scenario the steam was generated through a coal based boiler, to meet BAIPL's process requirement. The project activity would have installed a coal based boiler instead of a (husk) biomass based boiler for steam generation thus the project activity is environment friendly and leads to GHG emission reduction.

Prior to implementation of the project, the steam demand of BAIPL, would have been satisfied by fossil fuel (coal) based boilers. The installed biomass boiler generates steam to meet the demand of recipient plant and displaces the use of fossil fuel based boilers. The project technology utilizes appropriate treatment systems to ensure exhaust gas and discharged water in compliance with national environmental regulations. Many kinds of biomass fuel such as biomass briquette, sawdust, rice husk, and cashew can be used for the biomass boiler. Note that fossil fuel (i.e. furnace oil, coal, gas, etc) cannot be used for biomass fired boilers due to its specialized design of combustion chamber. The service level (e.g. temperature, pressure) of supplied steam in case of utilizing different types of renewable biomass residues is ensured by qualified boiler operators and is monitored by steam flow meter at recipient plant. The project activity will thus reduce Green house gas (GHG) emissions associated with the combustion of coal in baseline boilers. The project activity claims emission reduction for the thermal energy production by renewable energy technologies (biomass boilers) that displace the use of fossil fuel based boilers. This is in line with the applied methodology AMS I.C.

The $CO_2$ emission due to the combustion of husk is neutralized by the photosynthesis process of paddy crops. Hence, it "recycles" atmospheric carbon and does not add to the greenhouse effect. And also the husk contains negligible quantities of nitrogen and sulphur, hence the other green house gas (GHG) from the combustion of husk can be neglected for estimating carbon credits/offsets (CoUs). The coal being a carbon intensive fuel leads to GHG emissions hence implementation of the project activity leads to GHG emission reductions.
No transfer of technology is involved to host country because technology is available within India from reputed manufactures.

| Specification | Value |
|---|---|
| Capacity of Boiler | 14 TPH |
| Temperature | 180 $^0$C |
| Number of Boilers | 1 |
| Pressure | 10.54 kg/cm$^2$ |
| Feed Material | Rice Husk approx 81 TPD |
| Enthalpy of Steam* | 2.777 MJ/kg |
| Operation days/annum | 330 days/yr, 24hrs/day |
| Enthalpy of water @80 $^0$C* | 0.335 MJ/kg |
| Boiler Rating | 14*(2.777-0.335)/3.6 = 9.50 $MW_{thermal}$ |
| NCV Rice Husk | 3314 kcal/kg |
| Moisture Content Rice Husk | 7.03% |
| NCV Coal | 6823 kcal/kg |
| Feed Water Temp | 80 $^0$C |

The 14TPH biomass boiler was manufactured and installed by Thermax Ltd, Savli, Gujarat, India who specializes in the manufacturing of boilers in India. The service level of saturated steam from biomass boilers satisfies the requirements of recipient plant as confirmation of steam user. Well trained and qualified personnel have been deployed for operation of the biomass boiler.

During paddy/rice processing activities, rice husk is generated as a waste by-product and is stored in the husk yard within the project boundary. A conveyor belt continously feeds the rice husk into the boiler. BAIPL consumes approximately 241 kg of rice husk for each ton of steam produced for the captive steam requirements, hence about 3.374 tonnes of rice husk is required per hour, and 81 tonnes of rice husk is consumed per day.

| **Year 2021** | **Rice Husk (Biomass) tonnes consumed/month** |
|---|---|
| January | 1010 |
| February | 1840 |
| March | 2096 |
| April | 2093 |
| May | 1545 |
| June | 1512 |
| July | 1597 |
| August | 1330 |
| September | 1995 |
| October | 2113 |
| November | 2090 |
| December | 2102 |

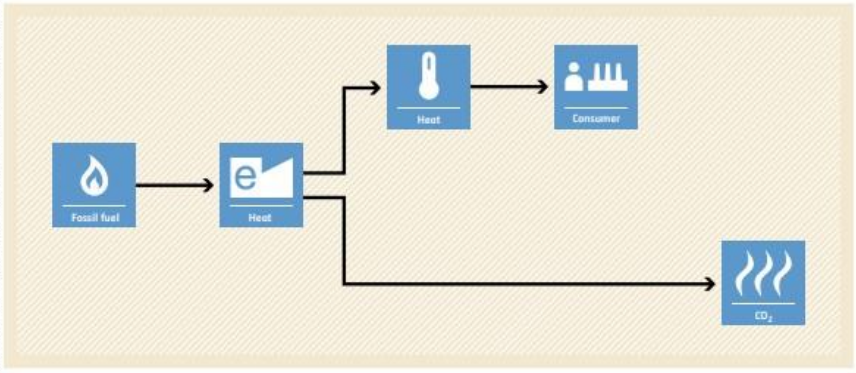
Calibrated flow meters are used for monitoring the steam generation from the boilers and steam supplied for the captive needs of the facility. These meters will be re-calibrated periodically. Rice husk quantity before and after drying is measured using weighing balance, which is periodically re-calibrated using standard weight.

## A.4. Parties and project participants >>

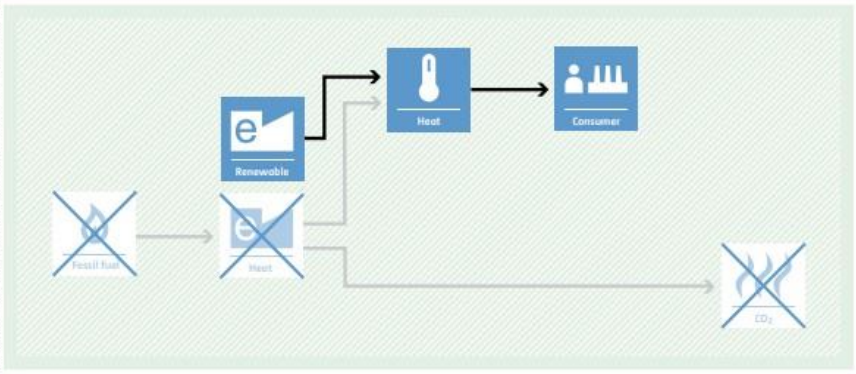
| Party (Host) | Participants |
|---|---|
| India | Project Proponent: Bhani Agro India Pvt Ltd<br>Aggregator: Ozone Envirotech Private Limited<br>UCR ID:776985763<br>Phone: 8558800447<br>Email: ozone.env@gmail.com |

## A.5. Baseline Emissions>>

**BASELINE SCENARIO**
Energy generation (thermal heat and / or electricity) by more-carbon-intensive technologies based on fossil fuel. In case of retrofits or capacity addition, operation of existing renewable power units without retrofit and capacity addition.




**PROJECT SCENARIO**
Energy generation by installation of new renewable energy generation units, by retrofitting or replacement of existing renewable energy generation units as well as by switch from fossil fuel to biomass in modified existing facilities.




The approved baseline methodology AMS IC, has been referred from the indicative simplified baseline and monitoring methodologies for selected small-scale UNFCCC CDM project activity categories.

The applicable methodology and simplified modalities and procedures for small scale CDM project activities, states that "*For renewable energy technologies that displace technologies using fossil fuels, 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 coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used.*"

**Emission coefficient of fuel used in the baseline scenario**
In absence of the project activity, the probable baseline scenario would have been steam generation using fossil fuel (coal). Thus to determine emission co-efficient BAIPL has used emission factor for coal as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories for GHG emissions which is 96.1 tCO2 /TJ.

**Emission coefficient of fuel used in the project activity**
The fuel used in the project activity is the biomass residues (rice husk), which is a carbon neutral fuel and therefore the emission coefficient (tC/TJ) is zero.

## A.6. Debundling>>
This project is not a debundled component of a larger registered carbon offset project activity.

## SECTION B. Application of methodologies and standardized baselines

### B.1. References to methodologies and standardized baselines >>

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-renewable sources)

TYPE I - Renewable Energy Projects

CATEGORY- ***AMS-I.C.: Thermal energy production with or without electricity (Ver. 21.0)***
This methodology comprises renewable energy technologies that supply users i.e. residential, industrial or commercial facilities with thermal energy that displaces fossil fuel use. These units include technologies such as energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.

### B.2. Applicability of methodologies and standardized baselines >>

| |
|---|
| The project activity is thermal energy generation project using a biomass (rice husk) based boiler that displaces equivalent amount of thermal energy that would have been generated by a fossil fuel based boiler. Since the project activity utilises rice husk for the generation of Thermal energy by displacing fossil fuel (coal), it meets the primary applicability criteria of the methodology. |
| The thermal generation capacity of project activity is 9.5$MW_{thermal}$ which is less than the threshold of 45$MW_{thermal}$ as per the applied methodology. |
| The biomass used by the project plant is not stored for more than one year. |
| The project activity is neither a co-generation nor co-firing system, therefore this condition is not applicable in the case of BAIPL project activity. |
| Biomass generated steam is used for captive use. |
| The project activity replaces the fossil fuel based thermal energy generation. There was no renewable energy based system prior to the project activity. |
| Thermal energy generation capacity are determined by taking the difference between enthalpy of total output leaving the project equipment and the total enthalpy of input entering the project equipment. |
| The installed biomass boiler generates steam to meet the demand of steam recipient plant and displace fully the use of fossil fuel based boilers. The project technology utilizes appropriate treatment systems to ensure exhaust gas and discharged water in compliance with national environmental regulations. Note that fossil fuel (i.e. furnace oil, coal, gas, etc) cannot be used for biomass fired boilers due to its specialized design of combustion chamber. The service level (e.g. temperature, pressure) of supplied steam in case of utilizing different types of renewable biomass residues is ensured by qualified boiler operators and is monitored by steam flow meter at recipient plant. The project activity will thus reduce Green house gas (GHG) emissions associated with the combustion of fuel oil in baseline boilers. The project activity claims emission reduction for the thermal energy production by renewable energy technologies (biomass boilers) that displace the use of fossil fuel based boilers. This is in line with the applied methodology AMS I.C requirements. |

### B.3. Applicability of double counting emission reductions >>

The biomass boiler is constructed by the project proponent within the boundary. The biomass boiler has a unique Ids (UP/8164), which is visible on the unit. Copies of all related Boiler Inspection Reports are provided to the UCR verifier during the verification process.

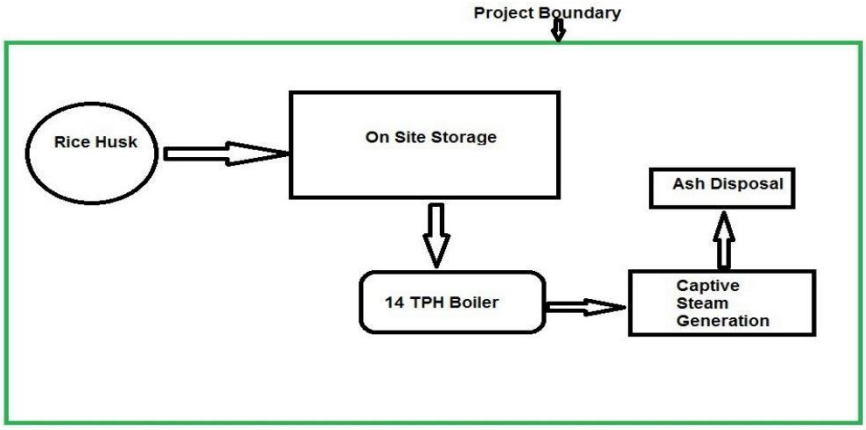
The project has never applied for carbon credits under any other GHG program or for the 2020-2021 vintage years and hence there is no double counting of the credits.The double counting avoidance agreement will be provided to the UCR verifier during the verification process.

## B.4. Project boundary, sources and greenhouse gases (GHGs)>>

TThe project boundary includes the physical, geographical site(s) of:

- Site of the renewable energy generation.
- Biomass based boiler, which starts from the biomass storage to the point of steam supply
- Biomass storage facility

| | Source | GHG | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseli | Co2 Emissions from fossil fuel in boilers for heat | $CO_2$ | **Included** | Major source of GHG emissions |
| | | $CH_4$ | Excluded | Excluded for simplification. This is conservative |
| | | $N_2O$ | Excluded | Excluded for simplification. This is conservative |
| Projec t | Emissions from Coal co-fired in the Project Activity | $CO_2$ | **Included** | Major source of GHG emissions |
| | | $CH_4$ | Excluded | Excluded for simplification. This is conservative |
| | | $N_2O$ | Excluded | Excluded for simplification. This is conservative |




Leakage Emissions is not applicable as the project activity does not use technology or equipment transferred from another activity.

There is no registered or an application to register another small-scale carbon project activity with the same project participants in the same project category within 1 km of the project boundary, hence the project activity is not a debundled component of a large scale project.

This is a new installation and the energy generating equipment is not transferred from another activity or the existing equipment was not transferred to another activity. So, no leakage is considered.

**B.5. Establishment and description of baseline scenario >>**

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

- *Renewable energy technologies that displace technologies using fossil fuels, wherein 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.*

Emission Reductions ($ER_y$) The emission reduction due to the project activity is calculated as the difference between the baseline emissions and the sum of the project emissions and the leakage:

$$ERy = BE_y - (PE_y + LE_y)$$

$BE_y$= Baseline emissions in year y (t $CO_{2e}$)

*As mentioned in the methodology AMS I.C, for steam produced using fossil fuels the baseline emissions are calculated as follows:*

$$BE_y = (HG_y * EF_{CO2}) / \eta_{th}$$

Where:

**HGy** = The net quantity of heat supplied by the project activity during the year in TJ. It is calculated as product of quantity of steam generated and net enthalpy of steam. The net enthalpy of steam is calculated as difference of enthalpy of steam and enthalpy of feedwater. The enthalpy of steam is calculated from steam pressure and steam temperature.

**$EF_{CO2}$** = The $CO_2$ emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO2/TJ), obtained from reliable local or national data if available, otherwise,IPCC default emission factors are used.

**$\eta_{th}$** – The efficiency of the boiler using fossil fuel that would have been used in the absence of the project activity (Table 1 below).

**PEy =** Project activity emissions = 0 since quantity of coal consumed during the monitoring period (18/01/2021 to 31/12/2021) = 0

**$LE_y$** = 0. Leakage emissions. There is no transfer of energy generating equipment or existing equipment to another activity. Further, emissions arising during the transportation of husk to the site is nil.

(Table 1) Default baseline efficiency values for different technologies as per AMS IC Methodology

| Technology of the energy generation system | Default efficiency |
|---|---|
| New coal fired boiler | 85% |

| Year | Days of operation |
|---|---|
| 2021 | 287 |

| | | |
|---|---|---|
| Enthalpy - Extracted Steam | 663.4 | kcal/ kg |
| Enthalpy of boiler feed w ater | 80 | kcal/ kg |
| Energy - Extracted Steam | 235 | TJ/annum |

**Total Emission Reductions for the current crediting period (2021)** =26624 $tCO_{2eq}$ (26624 CoUs)

## B.6. Prior History>>

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits.

## B.7. Changes to start date of crediting period >>

The start date of the crediting period has been revised and begins from 18/01/2021.

## B.8. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

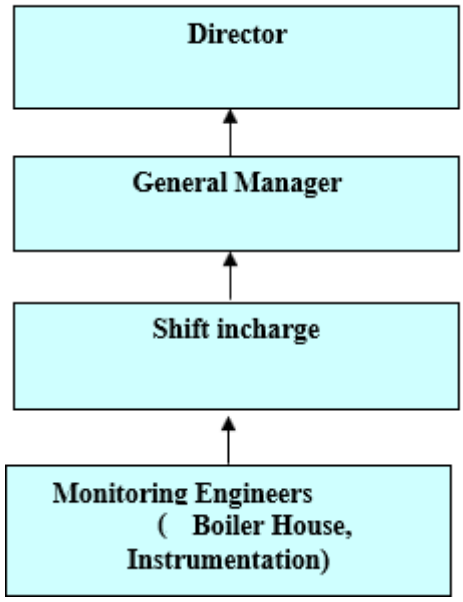
The boiler was first steam tested on 09/11/2020 which is taken as the commissioning date of the project activity as per the PCN. However, actual production at the project activity began on 18/01/2021. Hence the the current monitoring and crediting period is revised to begin from 18/01/2021.

## B.9. Monitoring period number and duration>>

First CoU Issuance Period: 1 Years, 0 Months
Crediting Period: 18/01/2021 to 31/12/2021
Monitoring Period: 18/01/2021 to 31/12/2021 (both days included)

## B.8. Monitoring plan>>

**Organisational structure for monitoring plan**




The monitoring and recording of the required parameters is carried out by trained personnel who are managed by the Project Managers. All measurements use calibrated measurement equipment that are maintained regularly and checked for its functioning which will meet the minimum requirement of the methodology. All indicators of importance for controlling and reporting of projects performance have been incorporated in the monitoring protocol and work instructions available in the control room at the site. Data parameters and log books and quantity of biomass used is provided during the verification of the project activity.

The project activity is designed with all other auxiliary plant systems like:

1. Rice husk handling system
2. Ash handling system
3. Air pollution control devices
4. Water system consists of following sub-systems:
    - Raw water system

- Condensate system
- Water treatment system
- Service and potable water system
- Compressed air system
- Fire protection system
- Complete electrical system for power plant including, instrumentation and control systems etc.

The technology used for the project activity is environmentally safe and sustainable.

| **Monitoring and calculation activities** | **Procedure and responsibility** |
|---|---|
| Data source and collection | Data is recorded daily and is monitored with the installed electronic data recording system. |
| Frequency | Monitoring frequency is daily. |
| Internal Review | All received data is reviewed by the engineers in the rice mill. |
| Data compilation | All the data is compiled and stored in power plant. |

| Data/Parameter | $Q_{biomass}$ |
|---|---|
| Data unit | 21323 tons per year |
| Description | The quantity of husk used to generate steam in the boiler |
| Source of data<br>Value(s) applied | Plant records and log books receipts of incoming quantity |
| Measurement methods and procedures | Monitoring: The quantity of biomass fed into the boiler is controlled.<br>Data type: Measured<br>Responsibility: Boiler Operator /Plant incharge |
| Monitoring frequency | Daily |
| QA/QC | The amount of biomass used is cross checked by the inventory for husk and measured daily as provided. |

| Data/Parameter | Total Steam Generated |
|---|---|
| Data unit | 89126 tons per year |
| Description | Steam generated from the boiler |
| Source | Plant. Not directly used in emission reduction calculation |
| Measurement methods and procedures | Steam flow meter at plant<br>Monitoring: Log book<br>Data type: Monitored |
| Monitoring frequency | Frequency: Daily |
| QA/QC | Archiving Policy: Paper & Electronic<br>Responsibility: Manager (plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: Once in every year. Or as specified by the boiler manufacturer. |

| Data/Parameter | $S_P$ |
|---|---|
| Data unit | 10.54 $Kg/cm^2$ |
| Description | Pressure of the steam at the outlet of the biomass boiler |
| Source | The steam pressure is measured using pressure gauge. This parameter is used to calculate the Net Enthalpy of steam. |
| Measurement methods and procedures | Monitoring: Log book<br>Data type: Monitored |
| Monitoring frequency | Daily/Hourly |
| QA/QC | The parameter is monitored and logged in log sheets. Based on the logged data, a report consisting of the parameter are prepared by Shift in charge in hard copy and are forwarded to manager on monthly basis. The data used is reviewed by conducting an inter department review meeting once in 6 months. |

| Data/Parameter | $T_{feedwater}$ |
|---|---|
| Data unit | $80^0C$ |
| Description | The temperature of feed water |
| Source of data<br>Value(s) applied | Plant Log Sheets |
| Measurement methods and procedures | Feed water temperature is measured in the plant premises by using temperature gauge. This parameter is used to calculate the Net Enthalpy of steam.<br>Monitoring: Log book<br>Data type: Monitored |
| Monitoring frequency | Daily |
| QA/QC | The parameter is monitored and logged in log sheets. Based on the logged data, a report consisting of the parameter are prepared by Shift in charge in hard copy and are forwarded to manager on monthly basis. The data used is reviewed by conducting an inter department review meeting once in 6 months. |

| Data/Parameter | **Calorific value of biomass** |
|---|---|
| Data unit | 3314 Kcal/kg |
| Description | Net calorific value of biomass used in the project activity |
| Source of data<br>Value(s) applied | Third party test Report |
| Measurement methods and procedures | Data Type: Estimated<br>Recording frequency:Annually<br>Archiving: Paper<br>Responsibility: Plant Supervisor<br>Procedure: Samples of biomass will be analyse for NCV from NABL accredited laboratoires. |
| Monitoring frequency | Yearly |
| QA/QC | Data is taken from third party approved lab |