	Monitoring report form for CDM project activity **(Version 09.0)**

MONITORING REPORT	
Title of the project activity	10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited
UNFCCC reference number of the project activity	5723
Version number of the PDD applicable to this monitoring report	05
Version number of this monitoring report	01.1
Completion date of this monitoring report	04/09/2023
Monitoring period number	01
Duration of this monitoring period	13/02/2012 to 31/12/2020 (both dates are included)
Monitoring report number for this monitoring period	01
Project participants	Sanjog Sugars & Eco-Power Private Limited
Host Party	India
Applied methodologies and standardized baselines	AMS I.D.- "Grid connected Renewable electricity generation", Version 18.0
Sectoral scopes	01

Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	33,313 tCO$_2$e	271,638 tCO$_2$e	NA

Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	460,550[1] tCO$_2$e

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[1] This is the ex-ante corresponding value for the equivalent period, whereas actual achieved ER is 304,951 tCO$_2$e. Detailed calculations are submitted in ER sheet.

SECTION A.   Description of project activity

A.1.   General description of project activity

>>

The project activity involves setting up of 10 MW biomass-based power generation project at Sangaria, Hanumangarh District of Rajasthan, India and is promoted by Sanjog Sugars & Eco-Power Private Limited (SEPPL). The project activity generates electricity and supplies to the Unified Indian Grid system (earlier as regional (Northern, Eastern, Western, North Eastern-NEWNE) electricity grid)[2]. The project activity consists of installation of one 47 TPH boiler with outlet parameters of 475° C and 66 kg/cm^2 (atm) pressure and one bleed cum condensing turbine of capacity 11.5 MW (normal output) with a rated output of 10 MW. The Biomass which is used for power generation in the project activity mainly includes cotton stalks and mustard husk available in the region. Other seasonally available renewable biomass residues in small quantities like paddy straw, sugar cane, groundnut husk, rice husk is utilised in force majeure conditions like change in cropping pattern. The project activity was commissioned on 7th October 2011.

The purpose of the project activity is to utilize the surplus biomass available in the region for generation of electricity and supply to the Indian Grid System to meet the ever-increasing demand for energy in the region and country. Thus, the project activity results in the reduction of GHG emission associated with generation of equivalent amount of power in the fossil fuel dominant electricity grid.

The electricity generated from the current monitoring period which is 13/02/2012 to 31/12/2020 is 363,037 MWh. The total emission reduction achieved by project activity is 304,951 tCO$_2$e.

A.2.   Location of project activity

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The project site is located in Sangaria Village, Hanumangarh District. The nearest railway station is Hanumangarh. The nearest airport is Delhi airport.

Latitude   : 29° 45'16.86''N
Longitude   : 74° 28'00.70" E

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[2] At the time of registration of the project, it was nominated under regional grid, called NEWNE grid. However, currently all regional grids are unified under Indian Grid System.

District Map of Hanumangarh
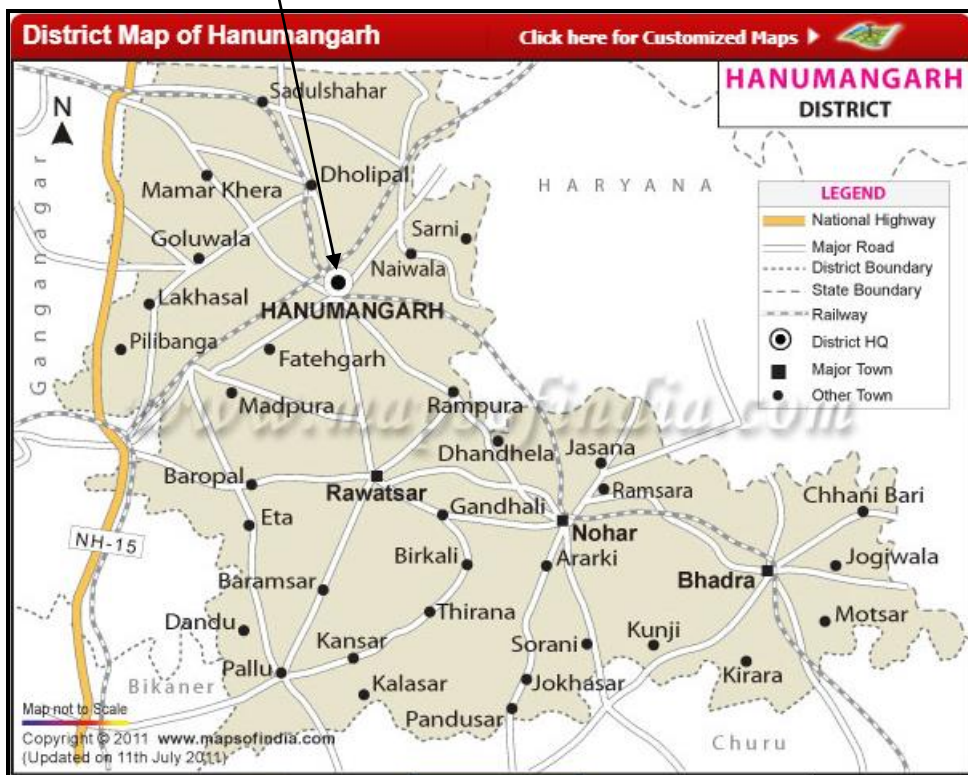
A.3.   Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Party)	Private Entity – M/s Sanjog Sugars & Eco-Power Private Limited	No

A.4.   References to applied methodologies and standardized baselines

>>
Following approved baseline & monitoring methodology is applied
Title: Type- I, Renewable energy project
Methodology: I.D.- Grid connected renewable electricity generation, Version 16.0[3]

The tools referenced in this methodology used for the proposed project includes:
- Guidance on the Assessment of Investment Analysis- Version 5[4]
- Tool to calculate the emission factor for an electricity system- Version 2.2.0[5]
- General guidance on leakage in biomass project activities, version 3[6].

A.5.   Crediting period type and duration

>>
Type: Fixed.
Duration: 10 years, 0 months.

The start of the crediting period   : 13/02/2012
The end date of the crediting period : 12/02/2022

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[3] https://cdm.unfccc.int/UserManagement/FileStorage/SJI52M6QXGKFNOZABTHDYPU789EV3C

[4] http://cdm.unfccc.int/filestorage/O/H/N/OHNFC4T6RUZEQXDL20JVG7MWK35YI1/eb62_repan5.pdf?t=QWJ8MTMxMTY2NTg5Ny4wNg==|QbiPUI4DeXq7zFF9HjpDSsQ36V0=

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf

[6] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid04.pdf

SECTION B. Implementation of project activity

B.1.   Description of implemented project activity

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The project activity is implemented as per the registered PDD. The primary biomass used for this project activity is cotton stalk and mustard stalk which is easily available in the region, also other seasonally available biomass residues like paddy straw, sugar cane, groundnut husk, rice husk. The proposed system consists of steam generator of 47 TPH capacity at 66 kg/cm2(atm) pressure, 475 °C temperature. The boiler is bi-drum, natural circulation and balanced draft type. The combustion system of the boiler shall be travelling grate with spreader stoker. The boiler unit includes superheater, economizer, drum and ai-preheater. The boiler includes sub systems like pressure parts, feeding system, firing system, draft system, feed water system, Electro Static Precipitator (ESP) and chimney.

The steam generated from the boiler drives the steam turbine of bleed cum condensing type with a normal output of 11.5 MW and rated output of 10 MW. The turbo generator unit is provided with all necessary auxiliary equipment including condensate pump, ejectors, gland steam condenser, ejector condenser. The power generated will be fed to the regional (NEWNE) electricity grid.

The technical specifications of all the equipment are as follows:

Technical specification of Travelling grate boiler:

Description	Specifications
Make	ISGEC JOHN THOMPSON
Type	Natural circulation, vertical bi-drum, semi-outdoor installation
Maximum continuous rating	47TPH
Grate	Travelling grate water tube
Steam pressure at superheater outlet	66 kg/cm^2
Steam temperature at superheater outlet	475± 5°C
Feed water temperature at economizer inlet	130 °C
Registered No. and Manufacture year	RJ-1765, 2008

Technical parameters of Turbogenerator:

Description	Specifications
Make	Triveni Engineering & Industries Limited
Type	Multistage, Horizontal axle blade design, Impulse type bleed cum condensing steam turbine
Rated capacity of turbine	11.5 MW
Steam pressure of turbine inlet	64 kg/cm^2
Steam temperature at turbine inlet	475°C
Condenser pressure	0.1 kg/cm^2
Cooling water temperature at inlet to condenser	32°C

Technical specification of Air-cooled condenser:

Description	Specifications
Make	GEI Industrial Systems Ltd.
Turbine exhaust steam flow rate	41.7 tons/hr
Turbine back pressure	0.18 ata
Turbine exhaust steam enthalpy	576.93 kcal/kg
ACC design ambient temperature	58.08 °C

Technical specification of Electrostatic precipitator:

Description	Specification
Make	Thermax Ltd.
Gas Flow	124200 Am^3/hr
Gas temperature	160°C
Dust concentration at ESP inlet	10 gm/Nm^3
Clean gas burden at ESP outlet with all fields	50 mg/Nm^3

Technical specification of AC generator:

Description	Specifications
Make	TDPS
Output	15000 kVA
Standard	IS 4722
Voltage (AC)	11000 V
Current (AC)	767 A
Frequency	50 Hz

The plant has been successfully commissioned on 7th October 2011. The plant has been in operation continuously since commissioning. However, during the current monitoring period i.e. 13/02/2012 to 31/12/2020, there was downtime/shutdown hours which as per the following:

Year	Downtime/Shutdown hours
2012	3393:30:00
2013	7702:23:00
2014	8285:27:00
2015	8359:47:00
2016	1545:18:00
2017	1349:46:00
2018	1455:28:00
2019	1573:59:00
2020	1108:14:00

There are no changes that have happened in the project activity which may impact the applicability of the methodology.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>> No temporary deviation taken place from the registered monitoring plan or applied approved methodology during the current monitoring period.

B.2.2. Corrections

>> No correction applied in fixed parameter mentioned in registered PDD during the monitoring period.

B.2.3. Changes to the start date of the crediting period

>> No change in start date of crediting period.

B.2.4. Inclusion of monitoring plan

>> There is no inclusion of monitoring plan to the registered PDD that was not included at registration.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>>There is no permanent change from registered monitoring plan or applied methodology.

B.2.6. Changes to project design

>>There is no change in project design of registered project activity during the current monitoring period.

B.2.7. Changes specific to afforestation or reforestation project activity

>> Not applicable as the project activity is not afforestation or reforestation project activity.

SECTION C. Description of monitoring system

>> The project proponent has a well-defined project management structure for monitoring the project activity. The monitoring plan describes the operation and management structure, parameters and variables, monitoring practices, QA and QC procedures, data storage and archiving etc.

Monitoring parameters:

The following parameters will be monitored in the project activity:
1. Electricity export
2. Electricity import
3. Net electricity generation.
4. Quantity of biomass fuel (Cotton stalk, Mustard husk and other biomass)
5. Net calorific value of biomass fuel (Cotton stalk Mustard husk and other biomass)
6. Moisture content of biomass fuel (Cotton stalk Mustard husk and other biomass)
7. Quantity of fossil fuel (diesel) consumption
8. Net calorific value of diesel
9. Density of diesel

Metering of electricity generation:

The "ABT" digital energy meter of standard make and accuracy (0.2) and identical check meters will be installed at the grid interconnection point. The monitoring will be done on continuous basis.

Calibration/QA-QC procedures:
The energy meter will be calibrated on an annual basis by the state nodal agency. In case of any failure in the main meter it would be replaced or calibrated immediately and for that time being check meter reading would be used for emission reduction estimation. In case the main meters are found to operate outside the permissible limits of error (0.2%), the meter shall be immediately calibrated and the error that is identified in the calibration would be applied to entire range of data from the date of last calibration. Similarly in case of any failure in the check meter it would be replaced or calibrated immediately. In case of failure of both the meters at a time no emission reduction will be claimed for the period starting from the date of failure to the date of replacement.

| Monitoring Devices |
|---|
| Bomb caloric meter (for NCV analysis) |
| Weighing scale |
| Oven (moisture analysis) |
| Muffle furnace |
| Steam flow meter |
| Weighbridge |
| Energy meter |

Other measuring equipment like bomb calorimeter (used for NCV analysis), standard weights, weighing balance and oven (used for moisture analysis) shall be calibrated by accredited third party once in every three years and calibration records shall be maintained. The bomb calorimeter shall be having an accuracy of RSD≤ 0.1%.

Data Collection and Archiving:
The monthly data of electricity generation is collected in both log book and electronic form. However, the data in electronic form is archived throughout the life time of the project. The electricity records are maintained regularly by the team at the site. Other data variables that are

most directly related to the emission reductions are collected and archived electronically. The archived data will be kept for 2 years beyond the Crediting Period.

The following chart shows the data flow for the monitored data for the project activity.
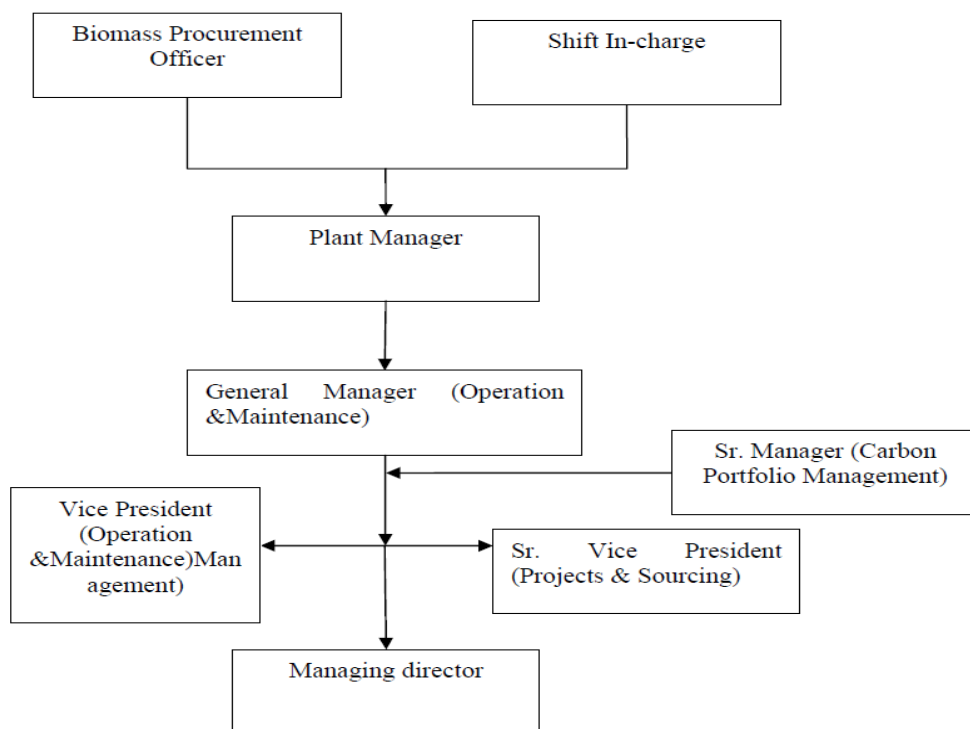
The table below shows the roles and responsibilities of the key personnels and the information flow for the project activity data.

Personnel	Responsibility
Biomass Procurement Officer	Biomass Procurement Officer is responsible for continuous monitoring of biomass procurement for project activity including records.
Shift In charge	Shift in charge will monitor the plant parameters including the monitoring parameters as described in the PDD.
Plant Manager	Plant Manager is responsible for the overall plant performance and electricity generation of the power plant. He would also ensure all plant specific activities in line with the monitoring plan including regular training etc.
General Manager (Operation & Maintenance)	General Manager (Operation & Maintenance) will check the generation reports and correct if there are any abnormalities in the power plant. He will also have review meetings periodically with Plant Manager to improve the Plant Performance. He will submit the report to Vice President (Operation & Maintenance)

SECTION D.   Data and parameters

D.1.   Data and parameters fixed ex ante

(Copy this table for each data or parameter.)

Data/Parameter	$EF_{grid,OM,y}$
Unit	tCO_{2e}/MWh
Description	Operating margin emission factor of NEWNE grid
Source of data	CEA data, CO2 Baseline Database, Version 5, http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf
Value(s) applied	1.004
Choice of data or measurement methods and procedures	The CO2 database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the CEA and hence considered authentic. (Weighted average of three years: 2006-07, 2007-08, 2008-09 is considered.)
Purpose of data/parameter	For the calculation of baseline emissions and its value remains fixed for the entire crediting period.
Additional comments	

Data/Parameter	$EF_{grid,BM,y}$
Unit	tCO_{2e}/MWh
Description	Build margin emission factor of NEWNE grid
Source of data	CEA data, CO2 Baseline Database, Version 5, http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf
Value(s) applied	0.675
Choice of data or measurement methods and procedures	The CO2 database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the CEA and hence considered authentic. (BM for the year 2008-09 is considered)
Purpose of data/parameter	For the calculation of baseline emissions and its value remains fixed for the entire crediting period.
Additional comments	

Data/Parameter	$SFC_{cotton\ stalk}$
Unit	Kg/kWh
Description	Specific consumption of cotton stalk
Source of data	DPR
Value(s) applied	1.203
Choice of data or measurement methods and procedures	The specific fuel consumption has been adopted from the value suggested in the DPR (Calculated based on net calorific value and station heat rate)
Purpose of data/parameter	For the calculation of baseline emissions.
Additional comments	its value remains fixed for the entire crediting period.

Data/Parameter	$SFC_{mustard\ husk}$
Unit	Kg/kWh
Description	Specific consumption of mustard husk
Source of data	DPR

Value(s) applied	1.308
Choice of data or measurement methods and procedures	The specific fuel consumption has been adopted from the value suggested in the DPR (Calculated based on net calorific value and station heat rate)
Purpose of data/parameter	For the calculation of baseline emissions.
Additional comments	its value remains fixed for the entire crediting period.

Data/Parameter	$EF_{CO2,grid}$
Unit	tCO_{2e}/MWh
Description	Combined margin emission factor of NEWNE grid
Source of data	CEA data, CO2 Baseline Database, Version 5, http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf
Value(s) applied	0.84
Choice of data or measurement methods and procedures	The CO2 database is an official publication of Government of India for the purpose of CDM baselines. $$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$$ $$= (0.5 * 1.004) + (0.5 * 0.675)$$ $$= 0.84\ tCO_2/MWh$$ $$= EF_{CO_2,grid,y}$$
Purpose of data/parameter	For the calculation of baseline emissions.
Additional comments	its value remains fixed for the entire crediting period.

Data/Parameter	$EF_{CO2,l,y}$
Unit	tCO_{2e}/TJ
Description	CO2 emission factor of the fossil fuel (i) (diesel) combusted in project activity during the year y
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.4
Value(s) applied	74.8
Choice of data or measurement methods and procedures	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval is used.
Purpose of data/parameter	For the calculation of project emissions.
Additional comments	Any future revision of the IPCC Guidelines shall be taken into account.

D.2. Data and parameters monitored

Data/Parameter	$EG_{export,y}$
Unit	MWh
Description	Electricity exported to the grid in the year y
Measured/calculated/ Default	Measured
Source of data	Joint meter reading records.
Value(s) of monitored parameter	**365,053 MWh** | Year	Electricity exported | |---|---| | 2012 | 39,911 | | 2013 | 6,933 | | 2014 | 3,565 | | 2015 | 3,079 | | 2016 | 59,587 | | 2017 | 63,937 | | 2018 | 61,738 | | 2019 | 60,856 | | 2020 | 65,447 | | Total | **365,053** |
Monitoring equipment	The "ABT" digital energy meter **Energy meter – Main meter, check meter** Make: SECURE METERS LTD. Serial No.: APMB-2215, APMB-2216 Accuracy Class: 0.25 Date of Calibration: 25.03.2019 / 04.09.2020 / 04.01.2022 Validity: One year
Measuring/reading/recording frequency	The energy meter readings are recorded continuously, measure hourly and recorded monthly.
Calculation method (if applicable)	Measure readings of the energy meter installed at the grid interconnection point. This will be recorded every month jointly by representative officials of SSEPPL and the grid/license. This record is archived and stored.
QA/QC procedures	The "ABT" digital energy meter of standard make and accuracy (0.2) and Identical check meters will be installed at the grid interconnection point. The energy meter readings will be monitored continuously, measured hourly and recorded monthly. In case the main meter becomes defective, the readings would be based on readings recorded on the check meter. The electricity exported will be cross verified against invoices raised by SSEPPL. The meter will be calibrated annually.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period. In case of failure of both main meter as well as check meter at a time, no emission reduction will be claimed for the period starting from the date of failure to the date of replacement.

Energy meter – Main meter, check meter	
Make	SECURE METERS LTD.
Serial No.	APMB-2215, APMB-2216
Accuracy Class	0.25
Date of Calibration	25.03.2019 04.09.2020 04.01.2022
Validity	One year

Data/Parameter	$EG_{import,y}$
Unit	MWh
Description	Electricity imported to the grid in the year y
Measured/calculated/ default	Measured
Source of data	Joint meter reading records.
Value(s) of monitored parameter	2016 MWh

Year	Electricity exported
2012	253
2013	296
2014	302
2015	89
2016	206
2017	174
2018	238
2019	259
2020	201
Total	**2,016**

Monitoring equipment	The "ABT" digital energy meter

Energy meter – Main meter, check meter	
Make	SECURE METERS LTD.
Serial No.	APMB-2215, APMB-2216
Accuracy Class	0.25
Date of Calibration	25.03.2019 04.09.2020 04.01.2022
Validity	One year

Measuring/reading/recording frequency	The energy meter readings are recorded continuously, measure hourly and recorded monthly.
Calculation method (if applicable)	Measure readings of the energy meter installed at the grid interconnection point. This will be recorded every month jointly by representative officials of SSEPPL and the grid/license. This record is archived and stored.
QA/QC procedures	The "ABT" digital energy meter of standard make and accuracy (0.2) and Identical check meters will be installed at the grid interconnection point. The energy meter readings will be monitored continuously, measured hourly and recorded monthly. In case the main meter becomes defective, the readings would be based on readings recorded on the check meter. The electricity exported will be cross verified against invoices raised by SSEPPL. The meter will be calibrated annually.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period. In case of failure of both main meter as well as check meter at a time, no emission reduction will be claimed for the period starting from the date of failure to the date of replacement.

Data/Parameter	$EG_{BL,y}$
Unit	MWh
Description	Net electricity supplied to the grid in the year y
Measured/calculated/ default	Calculated
Source of data	Joint meter reading
Value(s) of monitored parameter	**363,037** MWh
Monitoring equipment	Main energy meter **Energy meter – Main meter, check meter** <table><tr><td>Make</td><td>SECURE METERS LTD.</td></tr><tr><td>Serial No.</td><td>APMB-2215, APMB-2216</td></tr><tr><td>Accuracy Class</td><td>0.25</td></tr><tr><td>Date of Calibration</td><td>25.03.2019 04.09.2020 04.01.2022</td></tr><tr><td>Validity</td><td>One year</td></tr></table>
Measuring/reading/recording frequency	Continuous monitoring, hourly measurement, monthly recording
Calculation method (if applicable)	Calculated based on energy meter reading of electricity export and electricity import Net Electricity supplied to the grid in the year y =(Electricity exported to the grid in the year y) – (Electricity imported from the grid in the year y) = $EG_{export,y}$ - $EG_{import,y}$
QA/QC procedures	This is calculated as the difference of the electricity exported and the electricity imported as monitored above. The energy meter readings are monitored continuously, measured hourly and recorded monthly. These readings can be cross checked based on bills invoices raised by SSEPPL. This is the major parameter for calculation of emission reductions and is based on readings of the main or check meter installed at the interconnection point.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period.

Data/Parameter	Quantity of biomass fuel**cottonstalk**
Unit	Tonnes/year
Description	The quantity of biomass fuel cotton stalk used for electricity generation
Measured/calculated/ default	Measured
Source of data	Data from the Plant Log books
Value(s) of monitored parameter	133673

Monitoring equipment	Weighbridge

<table>
<tr><th colspan="2">Weighbridge</th></tr>
<tr><td>Make</td><td>SURYA UDAY ENGINEERS</td></tr>
<tr><td>Serial No.</td><td>IND/09/11/357</td></tr>
<tr><td>Capacity</td><td>120 MT</td></tr>
<tr><td>Class</td><td>3</td></tr>
<tr><td>Accuracy</td><td>5-15 kgs</td></tr>
<tr><td>Dates of Calibration</td><td>16.05.2023</td></tr>
<tr><td>Frequency of calibration</td><td>Annual</td></tr>
</table>

Measuring/reading/recording frequency	On each delivery Aggregated monthly
Calculation method (if applicable)	The biomass is brought from outside the project boundary in trucks. Weighbridge is used to measure the load in each truck. Each truck that enters the site will be recorded at the weighbridge installed at the factory and after unloading the biomass the empty truck will again be weighed in the weigh bridge to arrive at net quantity of biomass purchased. The readings will be recorded in the logbooks and an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. Monitoring: Continuously Recording: Daily
QA/QC procedures	The data recorded will be cross checked against purchase receipts and inventory records. And an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. This can be cross checked with the balance stock to monitor the amount of biomass procured and combusted. The weigh bridge (with accuracy class III) will undergo calibration as per statutory norms of Weights and Measures Act on annual basis.
Purpose of data/parameter	For calculation of baseline
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period.

Data/Parameter	Quantity of biomass fuel$_{\text{mustard husk}}$
Unit	Tonnes/year
Description	The quantity of biomass fuel mustard husk used for electricity generation
Measured/calculated/default	Measured
Source of data	Plant log books
Value(s) of monitored parameter	**270,262**

Monitoring equipment	Weighbridge **Weighbridge** <table><tr><td>Make</td><td>SURYA UDAY ENGINEERS</td></tr><tr><td>Serial No.</td><td>IND/09/11/357</td></tr><tr><td>Capacity</td><td>120 MT</td></tr><tr><td>Class</td><td>3</td></tr><tr><td>Accuracy</td><td>5-15 kgs</td></tr><tr><td>Dates of Calibration</td><td>16.05.2023</td></tr><tr><td>Frequency of calibration</td><td>Annual</td></tr></table>
Measuring/reading/recording frequency	On each delivery Aggregated monthly
Calculation method (if applicable)	The biomass is brought from outside the project boundary in trucks. Weighbridge is used to measure the load in each truck. Each truck that enters the site will be recorded at the weighbridge installed at the factory and after unloading the biomass the empty truck will again be weighed in the weigh bridge to arrive at net quantity of biomass purchased. The readings will be recorded in the logbooks and an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. Monitoring: Continuously Recording: Daily
QA/QC procedures	The data recorded will be cross-checked against purchase receipts and inventory records. And an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. This can be cross checked with the balance stock to monitor the amount of biomass procured and combusted. The weigh bridge (with accuracy class III) will undergo calibration as per statutory norms of Weights and Measures Act on annual basis.
Purpose of data/parameter	To check the energy mass balance
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period.

Data/Parameter	**Quantity of biomass fuel(other than cotton stalk and mustard husk)**
Unit	Tonnes/year
Description	The quantity of biomass fuel(other than cotton stalk and mustard husk) used for electricity generation
Measured/calculated/default	Measured
Source of data	Data from plant log books
Value(s) of monitored parameter	<table><tr><th>Biomass fuel</th><th>Tonnes (13/02/2012 to 31/12/2020)</th></tr><tr><td>Gram Husk</td><td>22677</td></tr><tr><td>Gwar Husk</td><td>12513</td></tr><tr><td>Juli Flora</td><td>805</td></tr><tr><td>Paddy straw</td><td>145377</td></tr><tr><td>Rice husk</td><td>59155</td></tr><tr><td>Sugar cane</td><td>12757</td></tr><tr><td>Wheat Straw</td><td>16302</td></tr><tr><td>Moong husk</td><td>11774</td></tr><tr><td>Groundnut husk</td><td>27961</td></tr><tr><td>Wood straw</td><td>1416</td></tr><tr><td>others</td><td>15784</td></tr></table>

Monitoring equipment	Weighbridge	
	Weighbridge	
	Make	SURYA UDAY ENGINEERS
	Serial No.	IND/09/11/357
	Capacity	120 MT
	Class	3
	Accuracy	5-15 kgs
	Dates of Calibration	16.05.2023
	Frequency of calibration	Annual
Measuring/reading/recording frequency	On each delivery Aggregated monthly	
Calculation method (if applicable)	The biomass is brought from outside the project boundary in trucks. Weighbridge is used to measure the load in each truck. Each truck that enters the site will be recorded at the weighbridge installed at the factory and after unloading the biomass the empty truck will again be weighed in the weigh bridge to arrive at net quantity of biomass purchased. The readings will be recorded in the logbooks and an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. Monitoring: Continuously Recording: Daily	
QA/QC procedures	The data recorded will be cross checked against purchase receipts and inventory records. And an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. This can be cross checked with the balance stock to monitor the amount of biomass procured and combusted. The weigh bridge (with accuracy class III) will undergo calibration as per statutory norms of Weights and Measures Act on annual basis.	
Purpose of data/parameter	To check the mass energy balance	
Additional comments	The data will be archived electronically and the archived data will be kept for 2 years beyond the Crediting Period.	

Data/Parameter	Moisture content of biomass$_{cottonstalk}$
Unit	Percentage
Description	Moisture content of cotton stalk
Measured/calculated/default	Measured
Source of data	Laboratory log book
Value(s) of monitored parameter	22
Monitoring equipment	Onsite laboratory
Measuring/reading/recording frequency	For every truck load
Calculation method (if applicable)	Sample of the biomass (cotton stalk) will be analyzed for moisture content in the onsite laboratory for each truck load. Weighing balance, standard weights and oven used for this purpose will be calibrated at least once in every three years. The weighted average should be calculated for each monitoring period and used in the calculations.
QA/QC procedures	Moisture content will be tested for every load of biomass procured from farmers / biomass traders. The lab log book records can be cross checked.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	

Data/Parameter	Moisture content of biomass$_{mustardhusk}$
Unit	Percentage
Description	Moisture content of mustard husk
Measured/calculated/ default	Measured
Source of data	Laboratory log book
Value(s) of monitored parameter	10
Monitoring equipment	Onsite laboratory
Measuring/reading/recording frequency	For every truck load
Calculation method (if applicable)	Sample of the biomass (mustard husk) will be analyzed for moisture content in the onsite laboratory for each truck load. Weighing balance, standard weights and oven used for this purpose will be calibrated at least once in every three years. The weighted average should be calculated for each monitoring period and used in the calculations.
QA/QC procedures	Moisture content will be tested for every load of biomass procured from farmers / biomass traders. The lab log book records can be cross checked.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	

Data/Parameter	Moisture content of biomass$_{others}$
Unit	Percentage
Description	Moisture content of cotton stalk
Measured/calculated/ default	Measured
Source of data	Laboratory log book
Value(s) of monitored parameter	<table><tr><th>Biomass fuel</th><th>Average of Moisture content for the current monitoring period</th></tr><tr><td>Ground Nut Husk</td><td>10%</td></tr><tr><td>Paddy Chipped</td><td>15%</td></tr><tr><td>Moong Husk</td><td>9%</td></tr><tr><td>Sugarcane Chip</td><td>18%</td></tr><tr><td>Gwar Husk</td><td>8%</td></tr><tr><td>Paddy bales</td><td>14%</td></tr><tr><td>Rice Husk</td><td>10%</td></tr></table>
Monitoring equipment	Onsite laboratory
Measuring/reading/recording frequency	For every truck load

Calculation method (if applicable)	Sample of the biomass (others) will be analyzed for moisture content in the onsite laboratory for each truck load. Weighing balance, standard weights and oven used for this purpose will be calibrated at least once in every three years. The weighted average should be calculated for each monitoring period and used in the calculations.
QA/QC procedures	Moisture content will be tested for every load of biomass procured from farmers / biomass traders. The lab log book records can be cross checked.
Purpose of data/parameter	For calculation of baseline emissions
Additional comments	

Data/Parameter	$NCV_{cottonstalk}$
Unit	Kcal/kg
Description	Net calorific value of cotton stalk
Measured/calculated/ default	Measured
Source of data	Laboratory log books
Value(s) of monitored parameter	3,162.14
Monitoring equipment	Sample of the biomass (cotton stalk) will be analyzed using bomb calorimeter for GCV, in the onsite laboratory on annual basis. NCV will be calculated based on GCV. <table><tr><td colspan="2" align="center">**Bomb Calorimeter**</td></tr><tr><td>Make</td><td>Pooja Scientific instruments</td></tr><tr><td>Accuracy</td><td>±0.0001°C</td></tr><tr><td>Date of Calibration</td><td>20.8.2022 20.08.2021 20.08.2020 20.08.2019 21.08.2018 20.08.2017 20.08.2016 21.08.2015 21.08.2014 21.08.2013 22.08.2012</td></tr><tr><td>Validity</td><td>One year</td></tr><tr><td>Frequency of calibration</td><td>Annual</td></tr></table>
Measuring/reading/recording frequency	Monthly or when used during the year and the average is calculated for the monitoring period.
Calculation method (if applicable)	Average value is calculated.
QA/QC procedures	The bomb calorimeter with an accuracy of RSD≤ 0.1% will be calibrated once in every three years. The net calorific value can be cross checked with lab log books. The consistency of the measurements can also be checked by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will be conducted.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for two years after the end of crediting period or the last issuance of CERs, whichever occurs later

Data/Parameter	NCV$_{mustardhusk}$
Unit	Kcal/kg
Description	Net calorific value of mustard husk
Measured/calculated/ default	Measured
Source of data	Laboratory log books
Value(s) of monitored parameter	3,151.88
Monitoring equipment	Sample of the biomass (mustard husk) will be analyzed using bomb calorimeter for GCV, in the onsite laboratory on annual basis. NCV will be calculated based on GCV. **Bomb Calorimeter** <table><tr><td>Make</td><td>Pooja Scientific instruments</td></tr><tr><td>Accuracy</td><td>±0.0001°C</td></tr><tr><td>Date of Calibration</td><td>20.8.2022 20.08.2021 20.08.2020 20.08.2019 21.08.2018 20.08.2017 20.08.2016 21.08.2015 21.08.2014 21.08.2013 22.08.2012</td></tr><tr><td>Validity</td><td>One year</td></tr><tr><td>Frequency of calibration</td><td>Annual</td></tr></table>
Measuring/reading/recording frequency	Monthly or when used during the year and the average is calculated for the monitoring period.
Calculation method (if applicable)	Average value is calculated.
QA/QC procedures	The bomb calorimeter with an accuracy of RSD≤ 0.1% will be calibrated once in every three years. The net calorific value can be cross checked with lab log books. The consistency of the measurements can also be checked by comparing the measurement results with measurements from previous years, relevant data sources (e.g., values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will be conducted.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for two years after the end of crediting period or the last issuance of CERs, whichever occurs later

Data/Parameter	NCV$_{biomass(others)}$
Unit	Kcal/kg
Description	Net calorific value of other biomass fuels used in the monitoring period
Measured/calculated/ default	Measured

Source of data	Laboratory log books
Value(s) of monitored parameter	<table><tr><th>Biomass fuel</th><th>Average of Net Calorific value for the current monitoring period (kcal/kg)</th></tr><tr><td>Ground Nut Husk</td><td>3,389.44</td></tr><tr><td>Paddy Chipped</td><td>2,509.30</td></tr><tr><td>Moong Husk</td><td>3,094.88</td></tr><tr><td>Sugarcane Chip</td><td>3,071.27</td></tr><tr><td>Gwar Husk</td><td>3,612.95</td></tr><tr><td>Paddy bales</td><td>2,541.80</td></tr><tr><td>Rice Husk</td><td>3,177.47</td></tr></table>
Monitoring equipment	Sample of the biomass (others) will be analyzed using bomb calorimeter for GCV, in the onsite laboratory on annual basis. NCV will be calculated based on GCV. <table><tr><th colspan="2">Bomb Calorimeter</th></tr><tr><td>Make</td><td>Pooja Scientific instruments</td></tr><tr><td>Accuracy</td><td>±0.0001°C</td></tr><tr><td>Date of Calibration</td><td>20.8.2022 20.08.2021 20.08.2020 20.08.2019 21.08.2018 20.08.2017 20.08.2016 21.08.2015 21.08.2014 21.08.2013 22.08.2012</td></tr><tr><td>Validity</td><td>One year</td></tr><tr><td>Frequency of calibration</td><td>Annual</td></tr></table>
Measuring/reading/recording frequency	Monthly or when used during the year and the average is calculated for the monitoring period.
Calculation method (if applicable)	Average value is calculated.
QA/QC procedures	The bomb calorimeter with an accuracy of RSD≤ 0.1% will be calibrated once in every three years. The net calorific value can be cross checked with lab log books. The consistency of the measurements can also be checked by comparing the measurement results with measurements from previous years, relevant data sources (e.g., values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will be conducted.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Data will be kept for two years after the end of crediting period or the last issuance of CERs, whichever occurs later

D.3.   Implementation of sampling plan

>> No sampling of data is required as all the parameters are being monitored individually.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>The procedures and formulas used for estimation of the baseline emission factor and the assumptions made have been detailed below. The emission reduction of the small scale project activity is the net electricity exported to the grid ($EG_{BL,y}$) in MWh multiplied by the baseline emission factor ($EF_{CO2,grid,y}$) in tCO_2/MWh.

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$$ -- Eq. 1

Baseline emission factor ($EF_{CO2,GRID}$)

The Baseline emission factor ($EF_{CO2,grid,y}$) is 0.84 tCO_2/MWh has been estimated and validated for NEWNE grid (now a part of unified Indian grid) of India, the applicable grid for the project activity. This is fixed ex-ante for the crediting period as per the registered PDD. The Baseline Emission is calculated as below.

Year	Net Power Supplied MWh	Grid emission factor (tCO_2/MWh)	Emission reduction tCO_{2e}
13/02/2012 to 31/12/2012	39,659		33,313
01/01/2013 to 31/12/2013	6,637		5,575
01/01/2014 to 31/12/2014	3,264		2,742
01/01/2015 to 31/12/2015	2,990		2,512
01/01/2016 to 31/12/2016	59,381	0.84	49,880
01/01/2017 to 31/12/2017	63,763		53,561
01/01/2018 to 31/12/2018	61,500		51,660
01/01/2019 to 31/12/2019	60,597		50,901
01/01/2020 to 31/12/2020	65,246		54,807
		Total	**304,951**

E.2. Calculation of project emissions or actual net removals

>>
In accordance with para B.6.1 of the registered PDD the project emission have been considered zero.

E.3. Calculation of leakage emissions

>>
In accordance with para B.6.1 of the registered PDD the leakage emissions have been considered zero.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
Total	304,951	0	0	33,313	271,638	0	304,951

E.5. **Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD**

Amount achieved during this monitoring period (t CO₂e)	Amount estimated ex ante for this monitoring period in the PDD (t CO₂e)
304,951	460,550

E.5.1. **Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"**

>>
Estimated ER according to the PDD = 51,803 tCO2 per year
Total number of days in this monitoring period = 3,245 days
So accordingly, by applying unitary method the estimated ER for the whole monitoring period becomes:
= (51,803*3245)/365
= 460,550 tCO$_{2e}$

E.6. **Remarks on increase in achieved emission reductions**

>>
There is 33% less emission reduction achieved during the current monitoring period in comparison with the registered PDD as the plant was shutdown due to some technical problems along with the annual maintenance of the plant.

E.7. **Remarks on scale of small-scale project activity**

>>The project remained within the boundary of small-scale activity throughout the monitoring period.

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Document information

Version	Date	Description
09.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN).
08.0	6 April 2021	Revision to: • Reflect the "Clarification: Regulatory requirements under temporary measures for post-2020 cases" (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.

Version	Date	Description
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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