



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	Biomass based cogeneration project at Bhagwati Vintrade, Ramgarh, Jharkhand, India	
UNFCCC reference number of the project activity	7444	
Version number of the PDD applicable to this monitoring report	04	
Version number of this monitoring report	1.0	
Completion date of this monitoring report	16/06/2018	
Monitoring period number	1.0	
Duration of this monitoring period	01/01/2013 to 31/08/2016 (both dates are included)	
Monitoring report number for this monitoring report	NA	
Project participants	M/s Bhagwati Vintrade Private Limited	
Host Party	India	
Sectoral scopes	Scope 1 - Energy industries (renewable/ non-renewable sources).	
Applied methodologies and standardized baselines	AMS-I.C. - Thermal energy production with or without electricity, version 19;	
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
	N/A	97,993 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	116,035 tCO ₂ e	

SECTION A. Description of project activity

A.1. General description of project activity

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The proposed project activity is promoted by Bhagwati Vintrade Private Limited (henceforth referred as BVPL), who are in the process of setting up a rice mill. The project activity entails installation of a new renewable biomass (rice husk) based cogeneration unit consisting of a 12 TPH boiler and a 1.2 MW turbo-alternator, set to cater to the demand of the rice plant of BVPL. The plant is expected to generate about 95,040 tonnes of steam and 9.504 GWh electricity per annum. In the absence of the project activity, equivalent amount of power and steam would have been sourced from more carbon intensive sources. The project activity thus reduces 31,646 tCO₂e/ annum greenhouse gas emissions (GHG) by avoiding fossil fuel combustion for steam and power generation.

The purpose of the proposed project activity is to install a biomass based cogeneration plant and utilise the energy (electricity and steam) for captive consumption. The plant is expected to generate about 95,040 tonnes of steam and 9.504 GWh electricity per annum by combusting rice husk, a (renewable) biomass residue obtained partially (12672 tonnes per year) in-house from own rice mill of 8 tonnes per hour (TPH) capacity and the rest (13733 tonnes per year) procured from other sources from within a 200 km radius of the project plant. The current connected load of the entire unit is 620 kW, which results in a requirement of 5.43 GWh per annum assuming 24 hours of operation each day for 365 days each year. There also exists provision for setting up another rice plant of 8 (TPH) capacity, that is envisaged to be catered by the project activity cogeneration plant. This project will result in avoidance of GHG emissions associated with generation of equivalent amount of energy from a coal based captive co-generation plant. Moreover the proposed project activity will also utilise the biomass which is a renewable source of energy and thus will prevent depletion of non-renewable natural resources like coal.

The project activity involves the installation of 12 TPH biomass fired single drum with water4 tube, fluidized bed combustion type boiler with outlet steam parameter at 40 kg/cm² and 400⁰ C and 1.2 MW. The brief technical specification is provided below for major equipments.

Boiler Specifications

Parameters	Details
Boiler type	Single drum, water tube, fluidized bed combustion
Boiler rated capacity	12 TPH
Steam pressure	40 kg/cm ² (g)
Steam temperature	400 °C
Feed water	105 °C
Supplier	Shreeji Enterprise, Ahmedabad

Turbine Specifications

Parameters	Details
Turbine type	Extraction cum condensing type steam
Inlet steam pressure	40 kg/cm ² (g)
Inlet steam temperature	400 °C
Inlet steam quantity	12 TPH
Extraction pressure	4 kg/cm ² (g)
Extraction steam bleed flow	7 – 9.5 TPH
Steam flow for condensing	2.5 – 5 TPH
Exhaust steam pressure	27 In Hg

Rated capacity of turbo-	1.2 MW
Supplier	SKS Power Pvt. Ltd.

A.2. Location of project activity

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The project activity is located as follows:

Host Part(ies) : India, State : Jharkhand, District: Ramgarh , Village : Bongabar, Post Office: Bharechnagar

The geographical co-ordinates of the project activity are as given below

Latitude: 23° 37' 47" N

Longitude: 85° 30' 36" E

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A: India	Private entity : M/s . Bhagwati Vintrade Private Limited	No

A.4. Reference to applied methodologies and standardized baselines

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Title of approved baseline and monitoring methodology:

As per the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, methodology AMS I. C. (Version 19) has been used.

Project Type : Type I – Renewable Energy Projects

Category : AMS I. C.

Title : Thermal energy production with or without electricity

Version : Version 19, (EB 61)

Tool reference: "Tool to calculate the emission factor for an electricity system".

Standardized baseline:

Not applicable.

A.5. Crediting period type and duration

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Crediting Period : Fixed crediting period (10 years).

Start date of the Crediting Period : 01/01/2013

End date of the Crediting Period : 31/12/2022

Duration of the Current Monitoring Period No 1st: 01/01/2013 – 31/08/2016

SECTION B. Implementation of project activity**B.1. Description of implemented project activity**

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The project activity involves the installation of 12 TPH biomass fired single drum with water4 tube, fluidized bed combustion type boiler with outlet steam parameter at 40 kg/cm² and 400⁰ C and 1.2 MW. The brief technical specification is provided below for major equipments.

Boiler Specifications

Parameters	Details
Boiler type	Single drum, water tube, fluidized bed combustion
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Turbine Specifications

Parameters	Details
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Extraction pressure	4 kg/cm ² (g)
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Steam flow for condensing	2.5 – 5 TPH
Exhaust steam pressure	27 In Hg
Rated capacity of turbo-	1.2 MW
Supplier	SKS Power Pvt. Ltd.

The plant is running successfully during the reported monitoring period. All the physical and technical features as stated in the registered PDD are in place and project has been operated as described in the registered PDD. No special events occurred during reported monitoring period. No events or situations happened during the reported monitoring period which can alter the applicability of the applied methodology.

B.2. Post-registration changes

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

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Not applicable

B.2.2. Corrections

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Not applicable

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

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There are no changes to the start date of the crediting period.

B.2.4. Inclusion of monitoring plan

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Not applicable

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

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Not applicable

B.2.6. Changes to project design

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Not applicable

SECTION C. Description of monitoring system

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The data monitoring will involve all the parameters mentioned in the section B.7.1. Due care will be taken for the measurement of all these parameters and maintenance of records. Proper training has been imparted to concerned personnel for accurate measurement and collection of data for each parameter. A final monitoring plan will be prepared prior to the initial verification based on the as-built project activity. It will address the following aspects:

1. The CDM monitoring team will be composed by the following staff:

Positio	Report
Operators	Manage
Shift In charge	
Manager	Unit head/External CDM consultant

2. The allocation of responsibility to ensure compliance with the monitoring requirement of the methodology is given here below:

	Task description	Operator (s)	Shift In	Manager	Unit Head
Monitoring activity					
1	Recording of monitored data	<	<		
Quality Assurance & Quality Control					
2	Verification of data monitored (consistency and completeness)		<	<	
3	Ensuring adequate training of staff			<	<
4	Ensuring adequate maintenance		<	<	<
5	Ensuring calibration of				
6	Data archiving: ensuring adequate				
7	Identification of non-conformance and				
8	Emergency procedures		<	<	
Calculation of GHG emission reductions and reporting					
9	Processing of data and calculation of emission				<
10	Monitoring report: management review of monitoring report			<	<

The unit head is responsible for the overall functioning and maintenance of the project activity. The Manager maintains all the data records and ensures the completeness and reliability of the data. The Shift In-charge and Shift operator maintain a day to day power and steam generation

log. The monitoring reports are checked periodically by the Manager and discussed thoroughly with the data monitoring personnel. Corrective action is taken immediately if any improper functioning or operation problem with the equipments is observed. The archived data shall be kept for two years after the crediting period. A log will also be maintained for the biomass supply on the site, its storage and usage in the project activity.

QA & QC Procedures to be followed

All meters will be calibrated as per industry practices at regular intervals. Records of calibration certificates will be maintained for verification. Hence, high quality is ensured with the above parameters.

Leakage Monitoring

No leakage is involved in the proposed project activity

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/parameter:	$\eta_{BL,cogen}$
Unit	%
Description	Cogeneration efficiency of the baseline plant
Source of data	Taken as maximum of the boiler and turbine efficiency provided by two manufacturers for similar equipment
Value(s) applied)	63.08 %
Choice of data or measurement methods and procedures	The efficiency value has been determined as per paragraph 29 (a) of the methodology
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	This value is determined ex-ante and will be fixed for the crediting period

Data/parameter:	EF_{FF,CO_2}
Unit	tCO ₂ /TJ
Description	The CO ₂ emission factor per unit of energy of the fuel (coal) that would have been used in the baseline plant.
Source of data	As per Table 2.2, Chapter-2, Volume-2, IPCC 2006 guidelines
Value(s) applied)	96.1
Choice of data or measurement methods and procedures	Default values provided in 2006 IPCC Guidelines for National Greenhouse Gas Inventories has been used for calculation.
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments	This value is determined ex-ante and will be fixed for the crediting period

D.2. Data and parameters monitored

Data/parameter:	$E_{PJ, \text{ electrical, } y}$
Unit	MWh/year
Description	Amount of electricity supplied by the project activity in an year y
Measured/calculated/default	Measured
Source of data	Log Book
Value(s) of monitored parameter	23728.917 (Total value for the current Monitoring period)
Monitoring equipment	Energy Meter
Measuring/reading/recording frequency:	Continuous monitoring and hourly recording is being carried out.
Calculation method (if applicable):	NA
QA/QC procedures:	Energy meter will be certified by third party as per national or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, or at least once in three years
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	T_{FW}
Unit	$^{\circ}\text{C}$
Description	Temperature of the feed water at boiler inlet
Measured/calculated/default	Onsite measurements
Source of data	Log Book
Value(s) of monitored parameter	101.97 (Average temperature during the monitoring period)
Monitoring equipment	Temperature Gauge
Measuring/reading/recording frequency:	Continuous monitoring and hourly recording is being carried out.
Calculation method (if applicable):	NA
QA/QC procedures:	Temperature Gauge will be certified by third party as per national or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, or at least once in three years;
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	E_{FW}
Unit	kcal /kg
Description	Enthalpy of feed water into boiler
Measured/calculated/default	Estimated based on feed water temperature using steam table
Source of data	Thermodynamic steam tables
Value(s) of monitored parameter	427.37

Monitoring equipment	NA
Measuring/reading/recording frequency:	Data is summarised in monthly sheets
Calculation method (if applicable):	Estimated based on feed water temperature using steam table
QA/QC procedures:	This value is obtained from thermodynamic steam tables. No need of QA/QC procedure.
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	Q_{steam}
Unit	Tonnes/year
Description	Extracted steam supplied to process plant in the year y
Measured/calculated/default	Onsite measurement
Source of data	Log Book
Value(s) of monitored parameter	2,15,556
Monitoring equipment	Monitoring: Steam flow meter.
Measuring/reading/recording frequency:	Frequency: Monitored daily, Cumulated daily data will give monthly data.
Calculation method (if applicable):	NA
QA/QC procedures:	Steam flow meter will be certified by third party as per national or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, or at least once in three years;
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	P_{process}
Unit	kg/cm ² (g)
Description	Pressure of the extracted steam from the turbine supplied to process in the year y
Measured/calculated/default	On site measurement
Source of data	Log Book
Value(s) of monitored parameter	4.96 (Average pressure during the monitoring period)
Monitoring equipment	Pressure Gauge
Measuring/reading/recording frequency:	Measured Frequency: once daily
Calculation method (if applicable):	NA
QA/QC procedures:	Pressure Gauge will be certified by third party as per national or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, or at least once in three years;
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	E_{Steam}
Unit	kcal/kg
Description	Enthalpy of extracted bleed steam from the turbine
Measured/calculated/default	Estimated based on steam pressure using steam table.
Source of data	Estimated based on steam pressure using steam table.
Value(s) of monitored parameter	2755.90
Monitoring equipment	NA
Measuring/reading/recording frequency:	Data is being summarised in a Monthly sheet
Calculation method (if applicable):	NA
QA/QC procedures:	This value is obtained from thermodynamic steam tables. No need of QA/QC procedure.
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	$B_{\text{Biomass},y}$
Unit	Tonnes/yr
Description	Quantity (dry basis) of biomass (rice husk) combusted in an year y
Measured/calculated/default	Onsite measurement
Source of data	26,405 tonne/yr, ex-ante calculated on energy basis
Value(s) of monitored parameter	<u>Monitoring:</u> Monitored, based on the data recorded at the weigh bridge and the remaining stock in the plant <u>Data Type:</u> measured & calculated <u>Frequency:</u> Annually <u>Archiving method:</u> Paper/Electronic <u>Responsibility:</u> Plant Manager would be responsible
Monitoring equipment	
Measuring/reading/recording frequency:	
Calculation method (if applicable):	NA
QA/QC procedures:	Consumption of biomass can be cross checked by invoices of biomass or annual mass balance that is based on purchased quantities and stock
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

Data/parameter:	NCV_k
Unit	GJ/tonne
Description	Net calorific value of rice husk
Measured/calculated/default	Laboratory test report
Source of data	-

Value(s) of monitored parameter	<u>Monitoring:</u> Determine once in the first year of the crediting period <u>Data Type:</u> measured <u>Archiving method:</u> Paper/Electronic <u>Responsibility:</u> Plant Manager would be responsible
Monitoring equipment	The laboratory would be duly accredited by the relevant authorities
Measuring/reading/recording frequency:	
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks
Additional comments:	Data archived: The archived data shall be kept for two years after the crediting period

D.3. Implementation of sampling plan

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Not Applicable

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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In the absence of project activity, steam and power would have been generated using coal in coal fired cogeneration unit of similar specifications. As per AMS-I.C., Version 19, paragraph 27, "For electricity and thermal energy (steam/heat) produced in a baseline cogeneration unit, using fossil fuel (case 19 (d)), the following equation shall be used to determine baseline emissions:"

$$BE_{cogen,CO_2,y} = [(EG_{PJ,thermal,y} + EG_{PJ,electrical,y} * 3.6) / \eta_{BL,cogen}] * EF_{FF,CO_2}$$

Where:

$BE_{cogen,CO_2,y}$	=	Baseline emissions from electricity and thermal energy displaced by the project activity during the year y; tCO ₂ e
$EG_{PJ,electrical,y}$	=	The amount of electricity supplied by the project activity during the year GWh
3.6	=	Conversion factor; TJ/GWh
$EG_{PJ,thermal,y}$	=	The net quantity of thermal energy supplied by the project activity during the
EF_{FF,CO_2}	=	The CO ₂ emission factor of the fossil fuel that would have been used in the baseline (tCO ₂)
$\eta_{BL,cogen}$	=	The total efficiency (including both thermal and electrical) of the cogeneration plant using

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

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

E.3. Calculation of leakage emissions

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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 ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	97,993	0	0	0	97,993	97,993

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

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
97,993	116,035

E.6. Remarks on increase in achieved emission reductions

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There is no considerable difference in the emission reductions during the current monitoring period relative to the estimation in the registered PDD. There is a decrease of around -18.41% emission reductions relative to estimation in the registered CDM- PDD for the equivalent duration of the monitoring period that is an acceptable difference for biomass base cogeneration projects.

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Document information

Version	Date	Description
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • 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 <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
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.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		