



Monitoring report form
(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	2.5 MW Rice husk based cogeneration plant at Hanuman Agro Industries Limited	
UNFCCC reference number of the project activity	1667	
Version number of the monitoring report	1	
Completion date of the monitoring report	18/05/2016	
Monitoring period number and duration of this monitoring period	Monitoring period 4 01/01/2013 to 06/11/2015	
Project participant(s)	M/s Hanuman Agro Industries Limited	
Host Party	India	
Sectoral scope(s)	Sectoral Scope 1: Energy Industries (renewable - /non renewable sources)	
Selected methodology(ies)	AMS I.C Thermal Energy for the user with or without electricity, Version 10	
Selected standardized baseline(s)	Not Applicable	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	92,782	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	78,866

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity, which is a 'carbon neutral fuel' based cogeneration plant, generates electricity in addition to steam to meet HAIL's captive electricity requirement thereby displacing power supplied from the State Grid. Apart from the electricity, project activity is saving the equivalent coal otherwise would have been used for steam generation in process plant. The new boiler is a high-pressure boiler with 22 TPH steam production. Envisaged generation MCR of 2,500 KW would comfortably meet the peak power demand, including the cogeneration auxiliaries. 9 TPH of extraction steam of 10 Kg/cm² from the turbine will adequately meet the process steam requirement at the mill. A part of the steam is fed to pulp section at 10 Kg/cm² and rest goes to paper section at 4 Kg/cm² through the existing pressure reducer. The generation will be synchronized with utility supply at 11 KV and step down to usage level of 400 V will be by the existing 11 KV/400 V transformer.

Since the project envisages the procurement & utilization of local biomasses for power generation and steam production, it will not only supplement the current & planned electricity generation from traditional fossil fuels but also conserve the fossil fuel (coal in this present scenario) and avoid harmful gas emissions that would arise from using the coal.

Hanuman Agro Industries Limited (HAIL) has successfully commissioned its 2.5 MW biomass based cogeneration plant on 31/08/2006 with a purpose to utilise local biomass (rice husk) for meeting captive heat and electricity requirements. The project activity is not only supplementing the current & planned electricity generation from traditional fossil fuels but also conserving the fossil fuel (coal in this present scenario) and avoiding harmful gas emissions that would arise from using the coal.

The project activity is using Fluidized bed combustion technology for generating heat and electricity. The installed capacity of the plant is 2.5 MW in cogeneration mode. The major plant/equipments installed within the project boundary involve

- 22 TPH Fluidised Bed Combustion Boiler
- 2.50 MW Extraction cum condensing Steam Turbine

The operations during the monitoring period from 01/01/2013 to 06/11/2015 have been able to achieve overall emission reductions of 78,866 tCO₂e,

A.2. Location of project activity

Town: Village Paragoan, Tehsil : Nawapara-Rajim , District : Raipur, Pin: 493885

State: Chhatisgarh,

Country: India

GPS Coordinates: 20°57'46" N Latitude, and 81°53'05" E Longitude

A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (Host Party)	M/s Hanuman Agro Industries Limited (HAIL)	No

A.4. Reference of applied methodology and standardized baseline

The project activity used the approved baseline and monitoring methodology for small scale CDM project activity under

Title: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories
 Type I : Renewable Energy Projects
 Category: AMS-I.C. Thermal Energy for the user with or without electricity, Version 10

A.5. Crediting period of project activity

Type – Renewable

Length of crediting period – 7 Years

The current first crediting period is from 07/11/2008 to 06/11/2015

Start date of crediting period is 07/11/2008

A.6. Contact information of responsible persons/entities

Person or entity responsible for the preparation of the monitoring report:

Manish Dabkara
 M + 91 99 07 53 49 00
 E manish@enkingint.org
 T +91 0731 42 89 086
 W www.enkingint.org

Above mentioned is not the project participant, details of the project participant has been mentioned in appendix 1.

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity****Technology employed for the project activity**

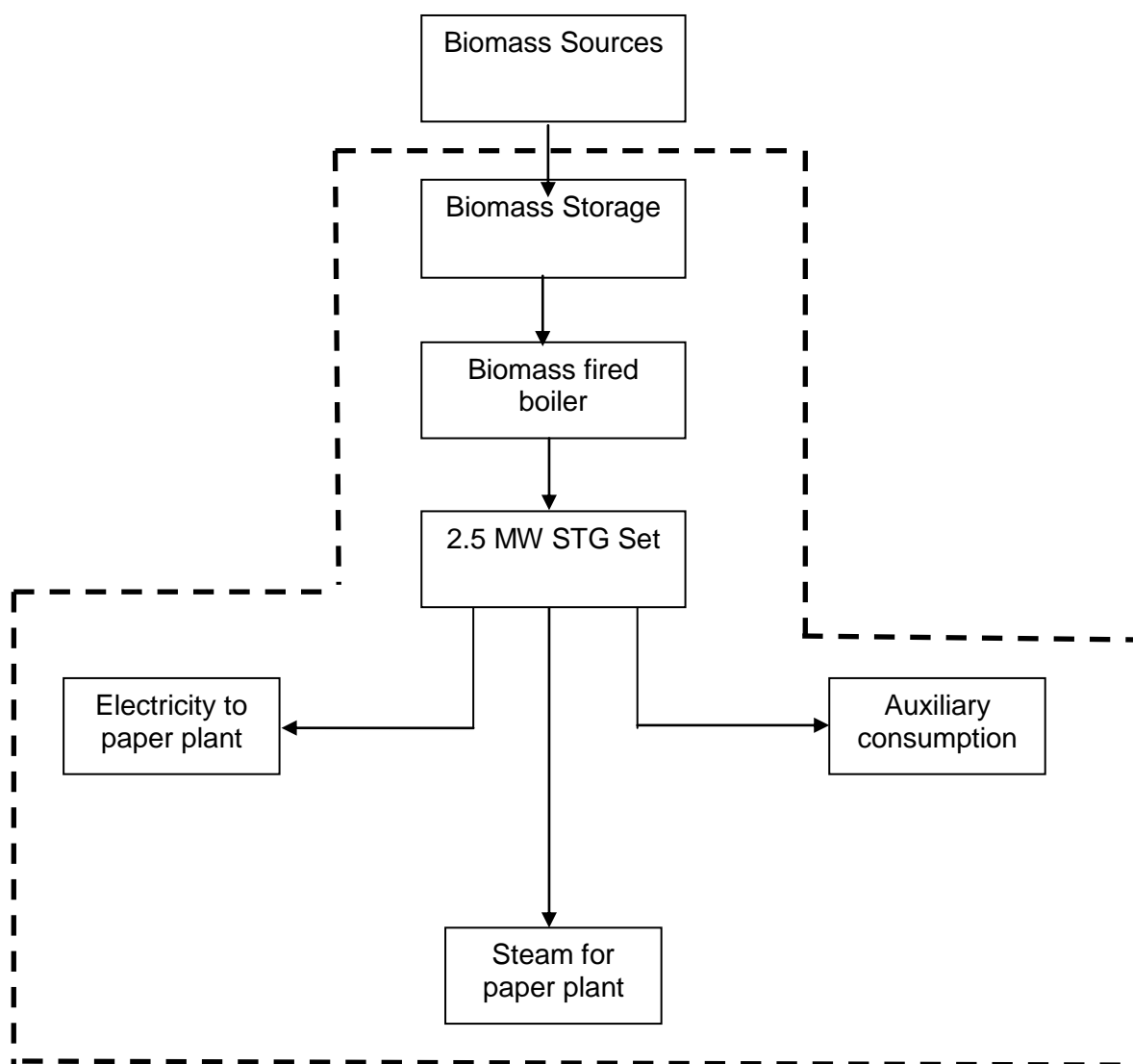
The plant installed one condensing cum extraction 2.5 MW turbine along with 22 TPH high-pressure boiler with steam parameters of 44 kg/cm² and 450 °C with a variation of +/- 5 deg C. This boiler is of modern design with fluidised bed furnace suitable for outdoor installation with water scrubber for dust collection. Uninterrupted flow of rice husk to the boiler is enabled by a twin bunker system located in front of the boiler. In case of exigencies of biomass fuel scarcity, HAIL purposes to use coal as fuel to the extent of 15%. The plant has seven days storage capacity for husk.

For generating maximum of 100% steaming capacity of the boiler at rated parameters, about 6.6 TPH of rice husk (100%rice husk firing) is required. The plant also has coal-handling facilities with necessary crushers and conveyors to meet the requirement in case of exigencies of biomass fuel scarcity. The project generates a gross power output of 2500 KW at the generator terminals. The power generation in the cogeneration plant is at 11 kV which is synchronised with utility supply at 11kV and step down to 440V level for usage in the plant with the use of 11kV/400V transformer. 9TPH steam at 10kg/cm² is used by the process which was in the baseline scenario done by the coal. This 9TPH steam is extracted from the 22TPH steam and fed to the process of paper machine and pulp mill. No transfer of technology is involved to host country because technology is available within India from reputed manufactures.

The plant is designed with all other auxiliary plant system like:

1. Rice husk and coal handling system.
2. Pneumatic Ash handling system
3. Air pollution control devices
4. Water system consist of following sub-systems:
5. Raw water system
6. Condensate system
7. RO system
8. Service and potable water system
9. Compressed air system
10. Fire protection system
11. Complete electrical system for power plant including, instrumentation and control system etc.

The schematic diagram of the proposed technology package is given below:



The project activity was completed as planned in the project design document (PDD). The Biomass based cogeneration power has been successfully commissioned on 31-08-2006. The project was completed with major equipment supplied as follows:

S. No.	Equipment	Supplier
01	Boiler	Cheema Boiler Ltd.

02	Turbine	Pentagon Turbine (P) Ltd.
03	Alternator	Kirloskar Electric
04	E.S.P.	Adhor and Cheema
05	Fuel Handling Plant	Bevcon (P) Ltd.
06	Ash Handling Plant	O.S.M. Engineering (P) Ltd.
07	Mist Cooling tower	Mist
08	Balance of Plant	Various suppliers like Siemens for breaker and panel. AVR, Kirlosar, Ion Exchange, R.O. D.M. Plant Ultra filtration etc.

The PP confirms that there has been no such event or to the project which would impact the applicability of the methodology of the project activity.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

Not Applicable

B.2.2. Corrections

Not Applicable

B.2.3. Changes to start date of crediting period

Not Applicable

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

Not Applicable

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

Not Applicable for current verification. Revision in monitoring plan was approved by UNFCCC on 14/07/2011

B.2.6. Changes to project design of registered project activity

Not Applicable

B.2.7. Types of changes specific to afforestation or reforestation project activity

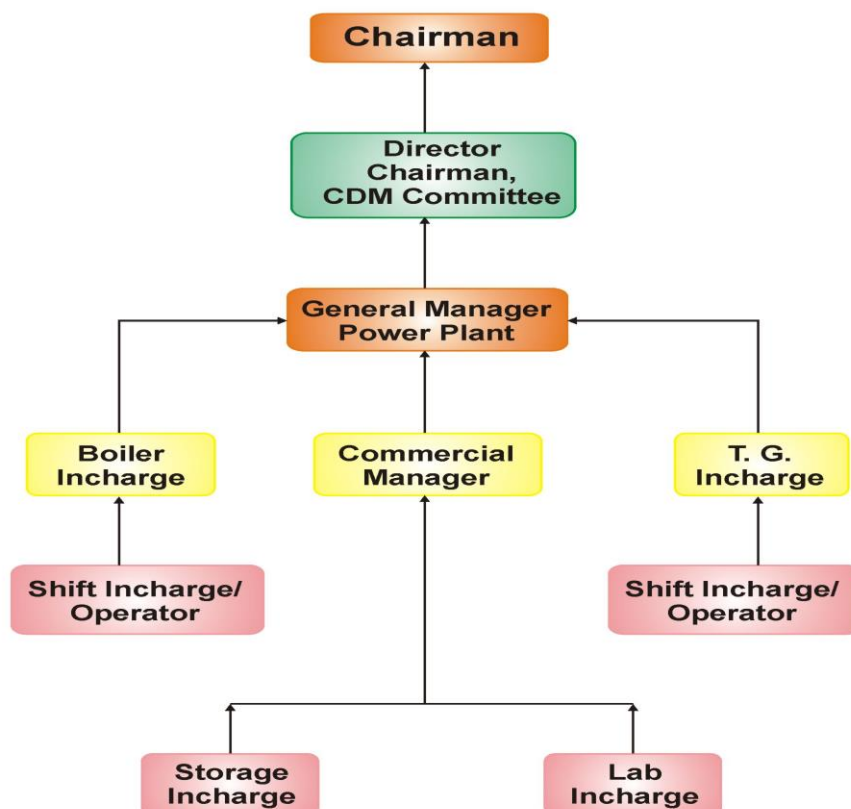
Not Applicable

SECTION C. Description of monitoring system

Description of Monitoring System Adopted

In accordance with the monitoring plan provided in the registered PDD with reference to the project category type AMS I.C. - Thermal Energy for the user with or without electricity Version 10, HAIL has implemented the monitoring system as per the approved plan:

- i. “CDM Monitoring Team” was constituted as under:



The roles & responsibilities of CDM Monitoring Team members have been summarised as under:

S. No.	Designation	Role & Responsibility
1.	Chairman	Ultimate responsibility of the project activity
2.	Director	Chairman of CDM Committee, holds the overall responsibility of the project activity
3.	G. M.	Vice President, CDM Committee, Act on behalf of the Director, will be responsible for overall management
4.	C. M.	Manager, CDM Committee, He will be responsible for monitoring the daily recordings of various data and to submit annual audit and brief monthly progress reports to the above.
5.	Boiler In-charge	responsible for record maintenance & daily recording steam generation & fuel consumption

6.	T. G. In-charge	responsible for record maintenance & daily recording power generation & power exported to paper plant
7.	Shift In-charge	responsible for record maintenance & recording of hourly data

- ii. Internal Reporting Procedure – The CDM technical support team is responsible for reporting defects and corrective action to the CDM Manager. The duties of the CDM Manager are to provide senior management representing the delegated authority of the Chairman with quarterly progress, annual audit and verification reports.
- iii. The monitored data is recorded continuously through online PLC system and manually on hourly basis in logbooks. Manual readings is entered onto forms and transferred to a computer file at weekly intervals and annual results received by the CDM office is inserted in a paper file and the values recorded on specific format transferred to a computer file.
- iv. Due training was imparted to CDM Monitoring Team Members on the entire process and procedures to be followed to monitor the emission reductions.
- v. The CDM team is trained on maintenance procedures, calibration, monitoring and reporting aspects related to monitoring emission reductions. Internal audits, verifications and emergency preparedness are a significant part of the training. In the CDM team, a special group of operators is formed who are assigned the responsibility of monitoring different parameters and record keeping as per the set procedures. Reviews are done on a regular basis to ensure conformance with the standards.

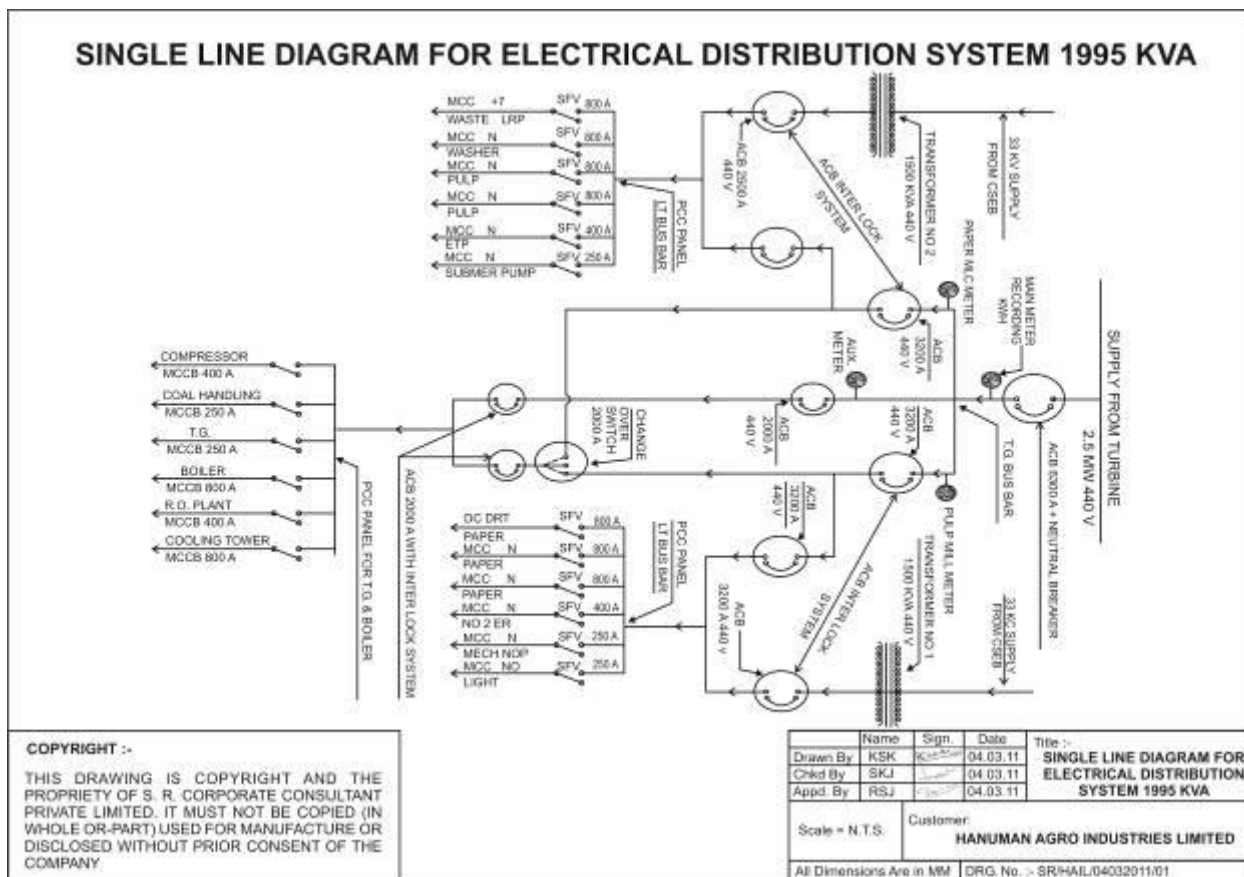
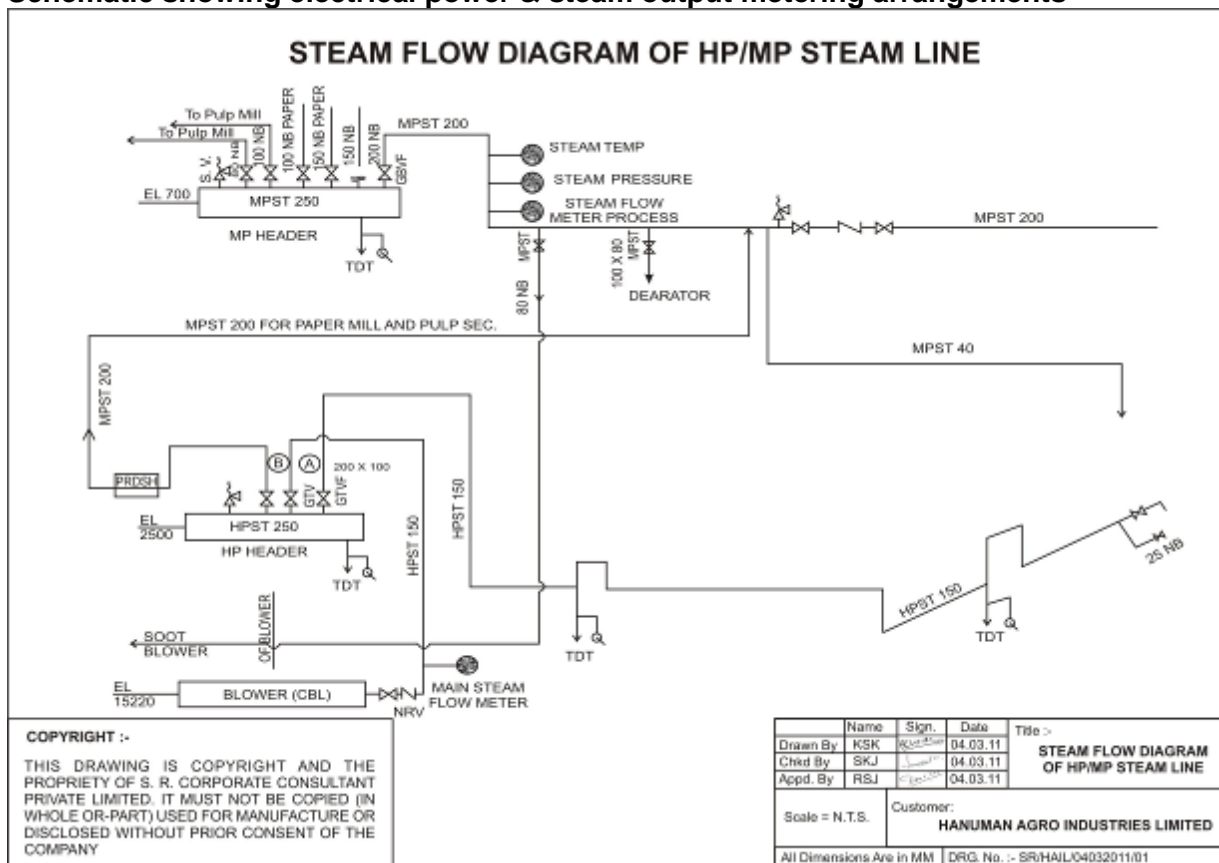
The Management, members of the CDM technical support team and other staff involved with the project activity and its monitoring also receive time to time training on:

- The CDM process and its broad aims
- The project management structure
- The project activity
- The principles of quality management applied to Emission Reductions
- Understanding and using the monitoring equipment
- Undertaking the procedures as described in the CDM quality manual
- Site safety

The training is delivered by external specialists in the first instance.

- vi. Due care was taken for monitoring calibration of monitoring equipments for quality control purpose. For this purpose a system has been evolved to record the information relating to calibration requirements of monitoring equipments.
- vii. Data Logging system in accordance with the approved monitoring plan has been implemented.
- viii. Maintenance Procedure as per the suppliers' instructions has been followed to minimise the risk of failure. To keep check on the defects/maintenance, proper recording system been introduced.
- ix. To ensure the quality of the monitoring system M/s EKI Energy Services Limited, a competent management consulting firm, has been engaged to carry out internal audit on annual basis. EKI has submitted their Internal Audit Report for the period from 01/01/2013 – 06/11/2015. It is reported that the Reporting requirements as per the Approved monitoring plan have been implemented and followed.
- x. To check the corrective actions being taken for the errors or deficiencies reported from internal audit or verifications, system has been evolved.
- xi. In case of any emergency situation, the CDM quality manual is followed and plant evacuation is done accordingly. In case of situations wherein there are meter failure, the damaged meter is replaced by the use of calibrated meters and the same is reflected in the internal audit with reason of failure.
- xii. The data for the period wherein meters are non functional are not considered for the calculation of emission reduction.

Schematic showing electrical power & steam output metering arrangements



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	NCV_{coal}
Unit	TJ/kt
Description	Calorific value of sub-bituminous coal
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied)	18.9
Choice of data or measurement methods and procedures	The data has been taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Purpose of data	Project Emission Calculations
Additional comments	-

Data/parameter:	CO₂EF_{coal}
Unit	Tonne CO ₂ per TJ
Description	Baseline Emission Factor for sub-bituminous coal
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value(s) applied)	96.10
Choice of data or measurement methods and procedures	The data has been taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Purpose of data	Baseline and Project Emission calculations
Additional comments	-

Data/parameter:	BEF_e
Unit	Kg CO ₂ per kWh
Description	Baseline Emission Factor for Western Grid of India
Source of data	Baseline Carbon Dioxide Emission Database & User Guide – Version 3.0 Prepared by Central Electricity Authority, Government of India
Value(s) applied)	0.79 (Lower of Combined Margin Factor and Weighted Average Margin Factor)
Choice of data or measurement methods and procedures	The value is taken from Baseline Carbon Dioxide Emission Database & User Guide – Version 3.0 Prepared by Central Electricity Authority, Government of India
Purpose of data	Baseline emission calculations
Additional comments	National Default Value provided by Central Electricity Authority, Government of India

Data/parameter:	η_{th}
Unit	%
Description	Boiler Efficiency
Source of data	Calculated on the basis of actual measured data during 2001 to 2006

Value(s) applied)	76.7%
Choice of data or measurement methods and procedures	The boiler efficiency is calculated on the basis of actual measured data during 2001 to 2006
Purpose of data	Baseline emission calculations
Additional comments	As per AMS-I.C. version 10 paragraph 13 (a), highest baseline boiler efficiency measured during last six years has been considered.

Data/parameter:	Q_{Biomass}
Unit	MT
Description	Evaluation of Surplus Biomass within a range of 50 Km from plant site
Source of data	Secondary as well as primary data to be collected by the third party working in this field
Value(s) applied)	84,086
Choice of data or measurement methods and procedures	The surplus biomass availability has been determined by third party.
Purpose of data	Baseline emission calculations
Additional comments	Fixed Ex-ante as per clause 18 of "General Guidance on leakage in biomass project activity Version 03" EB 47 Annex 28. Total quantity of rice husk, other biomass available in surplus that could be used as fuel in the plant had been carried out with professional help.

D.2. Data and parameters monitored

Data/parameter:	EG_{Gross}
Unit	GWh
Description	Total electricity generated from the project Activity.
Measured/calculated/default	Measured
Source of data	Measured data at Plant Site
Value(s) of monitored parameter	36.96
Monitoring equipment	Gross Energy Meter Sensor: Secure Accuracy Class: 0.2s Serial number: CSE42849 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Calibration: 06/12/2012, 05/12/2013, 04/12/2014
Measuring/reading/recording frequency:	Gross electricity generation had been measured through energy meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the meter made on hourly basis is noted on the logbook . This is updated and reported on the excel sheet on daily basis and further on monthly and yearly basis in the excel sheet. The parameter is measured using energy meters which measure the electricity in kWh and further updated to GWh on monthly basis while achieving on the excel sheet.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Gross Energy Meter. ■ check of the data logging by department head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis

Purpose of data:	This parameter is not directly used for Emission Reduction calculations. This parameter is required to be measured as per the requirement of methodology and is used for cross checking based on $EG_{Gross} - E_{Aux}$ vis-a-vis $EG_{paper} + EG_{pulp}$
Additional comments:	-

Data/parameter:	EG_{aux}
Unit	GWh
Description	Auxiliary Consumption by Power Plant
Measured/calculated/default	Measured
Source of data	Measured data at Plant Site
Value(s) of monitored parameter	4.24
Monitoring equipment	Auxiliary Energy Meter Sensor: Secure Accuracy Class: 0.2s Serial number: CSE42840 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Calibration: 02/12/2012, 01/12/2013 & 30/11/2014
Measuring/reading/recording frequency:	Auxiliary electricity consumption had been measured through energy meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the meter made on hourly basis is noted on the logbook. This is updated and reported on the excel sheet on daily basis and further on monthly and yearly basis in the excel sheet. The parameter is measured using energy meters which measure the electricity in kWh and further updated to GWh on monthly basis while achieving on the excel sheet.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Auxiliary Energy Meter. ■ check of the data logging by department head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	This parameter is not directly used for Emission Reduction calculations. This parameter is required to be measured as per the requirement of methodology and is used for cross checking based on $EG_{Gross} - E_{Aux}$ vis-a-vis $EG_{paper} + EG_{pulp}$
Additional comments:	-

Data/parameter:	EG_{paper}
Unit	GWh
Description	The electricity consumed by the Paper Section from the project activity.
Measured/calculated/default	Measured
Source of data	Measured data at Plant Site
Value(s) of monitored parameter	20.57

Monitoring equipment	Paper Machine Energy Meter Sensor: Secure Accuracy Class: 0.2s Serial number: CSE42838 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Last Calibration: 02/12/2012, 01/12/2013 & 30/11/2014
Measuring/reading/recording frequency:	Electricity supplied to Paper Mill section had been measured through energy meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the meter made on hourly basis is noted on the logbook. This is updated and reported on the excel sheet on daily basis and further on monthly and yearly basis in the excel sheet. The parameter is measured using energy meters which measure the electricity in kWh and further updated to GWh on monthly basis while achieving on the excel sheet.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Paper Machine Energy Meter. ■ check of the data logging by department head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	EG _{pulp}
Unit	GWh
Description	The electricity consumed by the Pulp Section from the project activity.
Measured/calculated/default	Measured
Source of data	Measured data at Plant Site
Value(s) of monitored parameter	12.15
Monitoring equipment	Pulp Mill Energy Meter Sensor: Secure Accuracy Class: 0.2s Serial number: CSE42839 Calibration Frequency: Annually Calibrating agency: Power Service Electricals Date Of Calibration: 02/12/2012, 01/12/2013 & 30/11/2014
Measuring/reading/recording frequency:	Electricity Supplied to Pulp Mill Section had been measured through energy meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the meter made on hourly basis is noted on the logbook. This is updated and reported on the excel sheet on daily basis and further on monthly and yearly basis in the excel sheet. The parameter is measured using energy meters which measure the electricity in kWh and further updated to GWh on monthly basis while achieving on the excel sheet.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Pulp Mill Energy Meter. ■ check of the data logging by department head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	EG _y
Unit	GWh
Description	The electricity consumed by the Paper and Pulp Section from the project activity.
Measured/calculated/default	Calculated
Source of data	Calculated as $EG_y = EG_{paper} + EG_{pulp}$
Value(s) of monitored parameter	16.38
Monitoring equipment	<ul style="list-style-type: none"> • Measurement Method: Calculation • Measurement Procedure: Calculated from EG_{paper} and EG_{pulp} on daily basis ($EG_{paper} + EG_{pulp}$). The data had been compiled on daily register then monthly and annual basis
Measuring/reading/recording frequency:	Net electricity supplied to the paper & Pulp mill had been measured through energy meter installed with the project boundary on continuous basis and The Net Energy Consumption had been Calculated from EG_{paper} and EG_{pulp} on daily basis and compiled on daily basis in Daily register then monthly and annual basis
Calculation method (if applicable):	$EG_y = EG_{paper} + EG_{pulp}$
QA/QC procedures:	<ul style="list-style-type: none"> ■ check of the data logging by department head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	$Q_{fc_biomass}$
Unit	MT
Description	Total quantity of biomass used for generation of power & steam had been maintained at Plant site in form of Daily logbooks at stores department.
Measured/calculated/default	Measured
Source of data	Measured at Plant Site
Value(s) of monitored parameter	84086
Monitoring equipment	Weigh Bridge: Make Avery Serial No.: 51-HY-L-105 Accuracy Class: 0.5% Calibration frequency: Annual Calibrating agency: Weights & Measurements Dept., Office of the Legal Metrology Date of Calibration : 18/03/2012, 17/03/2013, 16/03/2014 & 15/03/2015
Measuring/reading/recording frequency:	The Biomass quantity had been continuously measured at fuel receiving station & storage station through weighbridges. The supply of fuel to the steam generation set had been monitored on daily basis. Data had been recorded electronically as well as manually.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Weigh Bridge. ■ check of the data logging by Storekeeper on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis ■ Monthly biomass consumption is cross checked with the stock balance and further with the store receipts and biomass invoices.

Purpose of data:	This parameter is not directly used for Emission Reduction calculations. This parameter is used to cross check the heat generated by the boiler. Also, this is used to check which kind of fuel is fed into the boiler.
Additional comments:	-

Data/parameter:	Q_{fc_coal}
Unit	MT
Description	Total quantity of coal used for generation of power & steam had been maintained at Plant site in form of Daily logbooks at supply department
Measured/calculated/default	Measured
Source of data	Measured at Plant Site.
Value(s) of monitored parameter	11271
Monitoring equipment	Weigh Bridge : Make Avery Serial No.51-HY-L-105Accuracy Class: 0.5% Calibration frequency : Annually Calibrating agency: Weights & Measurements Dept., Office of the Legal Metrology Date of Calibration : 18/03/2012, 17/03/2013, 16/03/2014 & 15/03/2015
Measuring/reading/recording frequency:	The coal quantity was continuously measured at fuel receiving station & storage station through weighbridges. The supply of fuel to the steam generation set was monitored on daily basis. Data was recorded electronically as well as manually.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Weigh Bridge. ■ check of the data logging by Storekeeper on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis ■ Monthly coal consumption is cross checked with the stock balance and further with the store receipts and coal invoices.
Purpose of data:	Project emission
Additional comments:	-

Data/parameter:	$Q_{totalsteam}$
Unit	MT
Description	Total quantity of steam generated per hour had been maintained at Plant site in form of Shift Engineer's report
Measured/calculated/default	Measured
Source of data	Measured at Plant Site.
Value(s) of monitored parameter	379782.6

Monitoring equipment	Total Steam Flow Meter Make: SQ EDGE CONCERN Serial number: SS316/ Accuracy Class : 0.2% Calibration Frequency: Annually. Calibrating agency: Premier Engineering and Electrical Corporation/ Device Date Of Calibration: 24/07/2012 Make: ABB Serial number: 0078 Accuracy Class : 0.2% Calibration Frequency: Annually. Calibrating agency: Device Calibration and Instrumentation Date Of Calibration: 23/07/2013, 22/07/2014 & 21/07/2015
Measuring/reading/recording frequency:	Total Steam generation had been measured through steam flow meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the steam generation was made on daily basis and recorded on logbook.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Steam Flow Meter ■ check of the data logging by Department Head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	This parameter is not directly used for Emission Reduction calculations. This parameter is used to check the total heat quantity of the steam produced
Additional comments:	-

Data/parameter:	$Q_{\text{processsteam}}$
Unit	MT
Description	Total quantity of steam supplied per hour to the paper and pulp section had been maintained at plant site in the form of Shift Engineer's report
Measured/calculated/default	Measured
Source of data	Measured at Plant Site.
Value(s) of monitored parameter	210907. 4
Monitoring equipment	Steam Flow Meter Make: Endress+Hauser Serial number: C3015202000 Accuracy Class : 0.2% Calibration Frequency: Annually. Calibrating agency: Endress+Hauser Date Of Calibration: 22/09/2012, 21/09/2013 & 20/09/2014
Measuring/reading/recording frequency:	Process Steam supplied to Paper & Pulp Section had been measured through steam flow meter installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the steam generation was made on daily basis and recorded on logbook.
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Steam Flow Meter ■ check of the data logging by Department Head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	P _{processsteam}
Unit	Kg/cm ²
Description	Pressure of process steam supplied per hour shall be maintained at Plant site in form of Shift Engineer's report
Measured/calculated/default	Measured
Source of data	Measured at Plant Site.
Value(s) of monitored parameter	10
Monitoring equipment	Pressure Gauge Make: H-Guru Serial number:4649 Accuracy Class : 0.5% Calibration Frequency: Annually. Calibrating agency: Device Calibration and Instrumentation Date Of Calibration: 21/12/2012, 20/12/2013, 19/12/2014
Measuring/reading/recording frequency:	Pressure of total Steam supplied to Paper & Pulp Section had been measured through steam Pressure Gauge installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the steam generation was made on daily basis and recorded on logbook and further on excel sheet and used for calculation of emission reduction. Monthly average is calculated which is used to calculate the enthalpy
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Steam Pressure Gauge ■ check of the data logging by Department Head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	t _{processsteam}
Unit	Deg. C
Description	Pressure of process steam supplied per hour shall be maintained at Plant site in form of Shift Engineer's report
Measured/calculated/default	Measured
Source of data	Measured at Plant Site.
Value(s) of monitored parameter	183.5
Monitoring equipment	Temperature Gauge Make: Atco Allied Serial number: HAI/TG-01 Accuracy Class : 0.5% Calibration Frequency: Annually. Calibrating agency: Device Calibration and Instrumentation Date Of Calibration: 21/12/2012, 20/12/2013 & 19/12/2014
Measuring/reading/recording frequency:	Temperature of total Steam supplied to Paper & Pulp Section had been measured through steam temperature Gauge installed within the project boundary on continuous basis and Data had been recorded electronically through online PLC system and spot readings of the steam generation was made on daily basis and recorded on logbook and further on excel sheet and used for calculation of emission reduction. Monthly average is calculated which is used to calculate the enthalpy

Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ Measurement through accurately calibrated Steam Temperature Gauge ■ check of the data logging by Department Head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

Data/parameter:	Steam Enthalpy
Unit	KJ/Kg
Description	Heat value of process steam supplied to paper & pulp section
Measured/calculated/default	Calculated through http://www.spiraxsarco.com/Resources/Pages/steam-tables.aspx
Source of data	Calculated
Value(s) of monitored parameter	2780.79
Monitoring equipment	Calculated on monthly average value of steam pressure and temperature through above web link The process steam required for the project activity is saturated steam. The steam enthalpy parameter can be calculated based on either pressure of steam or temperature of steam. Enthalpy is calculated from both pressure and temperature and lower enthalpy out of the two has been considered for emission reduction calculation. Enthalpy has been considered based on the temperature, with saturated temperature as an input value in the steam table. The enthalpy has also been considered based on pressure, with saturated pressure as an input value. The lower value of enthalpy is considered which is conservative.
Measuring/reading/recording frequency:	Calculated on monthly average value of steam pressure and temperature through above web link
Calculation method (if applicable):	N.A
QA/QC procedures:	<ul style="list-style-type: none"> ■ check of the data logging by Department Head on daily basis ■ check of the data logging by Commercial Manager on weekly basis ■ check of the data logging by General Manager on monthly basis
Purpose of data:	Baseline emission calculations
Additional comments:	-

D.3. Implementation of sampling plan

Not Applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The baseline emission involves two components

i. Baseline Emission Reductions resulting from Steam/heat produced using fossil fuel:

$$BE_{th} = HG_y * CO_2EF_{coal} / \eta_{th}$$

Where:

BE_{th} : The baseline emissions from steam/heat displaced by the project activity during the year y in tCO₂e.

HG_y : The net quantity of steam/heat supplied by the project activity during the year y in TJ.

CO_2EF_{coal} : the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO_2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

η_{th} : the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

ii. Carbon Emission reduction per annum by project activity due to displacement of electricity from Grid:

$$BE_{el} = EG_y \times BEF_e$$

Where ,

BE_E : Carbon Emission reduction per annum by project activity due to displacement of electricity from Grid in $t CO_2$

EG_y : Net power supplied by the project activity i.e. Clean Power to be consumed by the entity replacing the Grid Power in GWh.

BEF_e : Baseline Emission Factor for Western Grid of India in $Kg CO_2$ per kWh

iii. Total Baseline Emission reduction per annum by project activity (BE_y)

$$BE_y = BE_{th} + BE_{el}$$

E.2. Calculation of project emissions or actual net GHG removals by sinks

Onsite Project Emission expected from the Project Activity (PE_y):

The project may use coal as auxiliary fuel to the extent of 15% in case of exigency. The MNES also allows use of fossil fuel to the extent of 25% in case of exigencies.

In the project activity during the monitoring period 11.8% was the coal consumption. Hence the coal consumption has found to be below 15%.

Accordingly the project emissions in the form of tonnes CO_2 from combustion of coal is calculated using CO_2 emission factor refereeing the IPCC 2006 Guidelines for National Green House Gas Inventories. Formula used for calculation:

$$PE_y = NCV_{coal} \times Q_{fc} \times CO_2EF_{coal}$$

Where

PE_y : Carbon-dioxide emission due to coal burning at project site in tCO_2

NCV_{coal} : Calorific value of sub-bituminous coal in TJ/Kt

Q_{fc} : Quantity of coal burned in MT

CO_2EF_{coal} : Baseline Emission Factor for sub-bituminous coal

E.3. Calculation of leakage

There is no energy generating equipment being transferred from or to another activity.

There is surplus availability of biomass, therefore leakage emissions are not considered.

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	99,338	20,472	0	0	78,866	78,866

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	92,782	78,866

E.6. Remarks on difference from estimated value in registered PDD

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This decrease has been due to the seasonal requirement of paper manufacturing wherein the plant was not on full capacity. Also there has been periods of shutdown in the plant resulting in the lowering of production.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Hanuman Agro Industries Limited
Street/P.O. Box	2, Hare Street,
Building	Nicco House, Block-c, 6th Floor
City	Kolkatta
State/region	West Bengal
Postcode	700 001
Country	India
Telephone	+91- 033 2243 0026
Fax	+91- 033 2230 9807
E-mail	anil@hailgroup.in
Website	NA
Contact person	Anil Kanoria
Title	
Salutation	Mr
Last name	Kanoria
Middle name	
First name	Anil
Department	
Mobile	+91- 9831180884
Direct fax	+91- 033 2230 9807
Direct tel.	+91- 033 2243 0026
Personal e-mail	anil@hailgroup.in

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	EKI Energy Services Limited
Street/P.O. Box	Plot 48, Scheme 79, Part- 2, Vijay Nagar
Building	Enking Embassy
City	Indore
State/region	Madhya Pradesh
Postcode	452010
Country	India
Telephone	+91 731 4289086
Fax	+91 731 4289086
E-mail	manish@enkingint.org
Website	www.enkingint.org
Contact person	Manish Dabkara
Title	CEO
Salutation	Mr.
Last name	Dabkara
Middle name	
First name	Manish
Department	CDM Services
Mobile	+91 9907534900
Direct fax	+91 731 4289086
Direct tel.	+91 731 4289086
Personal e-mail	manish@enkingint.org

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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.
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 (EB70, 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	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		