

**MONITORING REPORT FORM (CDM-MR) \***  
**Version 01 - in effect as of: 28/09/2010****CONTENTS**

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**MONITORING REPORT**  
**Version number 01, 31/08/2011****2.5 MW Rice Husk Based Cogeneration Plant at Hanuman Agro Industries Limited**  
**UNFCCC reference number:1667**  
**Second Monitoring period: 01/01/2010-30/06/2011 (Both days included)****SECTION A. General description of the project activity****A.1. Brief description of the project activity: >>**

&gt;&gt;

Hanuman Agro Industries Limited (HAIL) has successfully commissioned its 2.5MW biomass based cogeneration plant on 31/08/2006 with a purpose to utilise local biomass for meeting captive heat and electricity requirements. The project activity it 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 arisen 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 have been able to achieve overall emission reductions of 56084 tCO<sub>2</sub>e, details thereof is provided in the following table:

<b>Year</b>	<b>overall emission reductions</b>
	<b>(tCO<sub>2</sub>e)</b>
2010 (01.01.10 to 31.12.10)	33447
2011 (01.01.11 to 30.06.11)	22636
<b>Total (tonnes of CO<sub>2</sub>e)</b>	<b>56084</b>

**A.2. Project Participants**

&gt;&gt; M/s Hanuman Agro Industries Limited (HAIL)

**A.3. Location of the project activity:**

&gt;&gt;

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

State: Chhatisgarh,

Country: India

GPS Coordinates: 20°57'46 N Latitudes, 81°53'05 E Longitude

**A.4. Technical description of the project****>>Technology employed for the project activity**

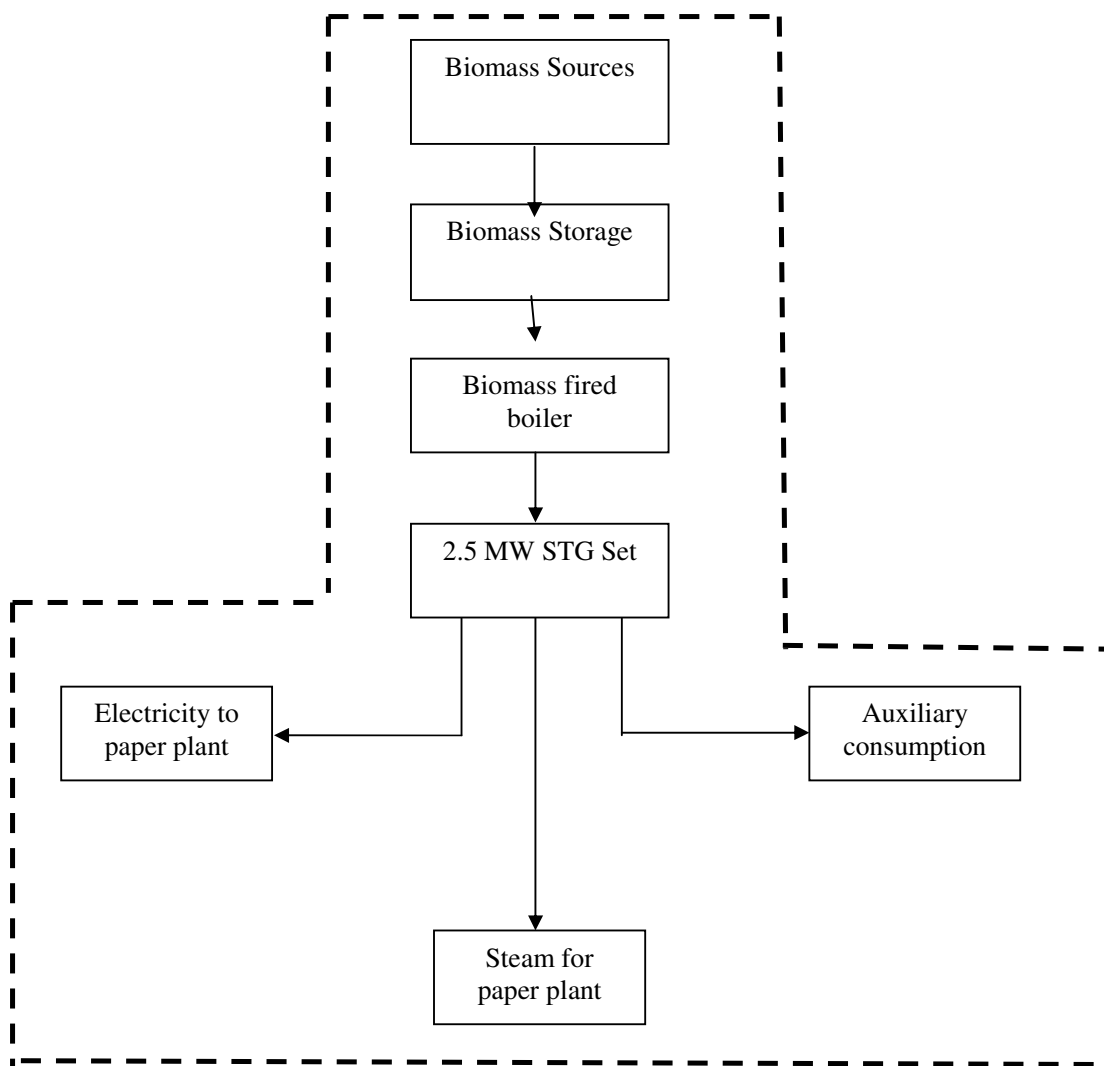
The plant installed one condensing cum extraction turbine along with 22 TPH high-pressure boiler with steam parameters of 44 kg/cm<sup>2</sup> and 450 °C. This boiler is of modern design with fluidised bed furnace suitable for outdoor installation with water scrubber for dust collection. Uninterrupted flow of rice husk to the boiler 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 440V level. 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:



**A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:**

>>

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-1.C. Thermal Energy for the user with or without electricity, Version 10

The baseline methodology had followed the one specified in Para 6 & 7 and the monitoring methodology in Para 17(b) of the referred document.

**A.6. Registration date of the project activity:**>> Registration date of the project activity: **07/11/ 2008****A.7. Crediting period of the project activity and related information (start date and choice of crediting period):**

&gt;&gt;

Start Date: 07/11/2008 which in accordance with the start date specified in PDD i.e. 01-01-2008 or the date of Registration under UNFCCC, whichever is later.

Crediting period: 7 years' Renewable crediting period in accordance with the registered PDD

**A.8. Name of responsible person(s)/entity(ies):**

&gt;&gt; Mr. Anil Kanoria Director, Hanuman Agro Industries Limited,

**SECTION B. Implementation of the project activity****B.1. Implementation status of the project activity**

>> 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, Kirloskar, Ion Exchange, R.O. D.M. Plant Ultra filtration etc.

The project activity has been in continuous operation except for few Hours during the monitoring period, as given below:

**Outages details for the period From 01.01.2010 to 30.06.2011**

DATE	TIME	DURATION HOURS	TYPE	REASON
21.01.2010	01:02 PM to 04:30 PM	3.28hrs	Un-planned	Pulp mill breaker problem
14.03.2010 to 16.03.2010	02:20 PM to 01:40 PM	47:20hrs	Un-Planned	T.G. Trip due to main 6300A ACB contact flash over
01.04.2010 to 03.04.2010	01:20 AM to 03:50 PM	38.30 hrs	Un-planned	Due to Main ACB problem
20.04.2010 to 21.04.2010	11:20 AM to 04:40 PM	29.20hrs	Planned	Due to raw material shortage
03.05.2010 to 04.05.2010	02:00 PM to 06:30 PM	28:30hrs	Planned	T.G. shut due to pulp shortage



15.05.2010 to 18.05.2010	02:10 PM to 02:30 PM	72:20hrs	Un planned	T.G. shut due to fuel shortage
27.05.2010 to 28.05.2010	01:50 PM to 08:00 PM	30.10hrs	Planned	Due to raw material shortage
15.06.2010 to 18.06.2010	09:45 AM to 06:00 PM	80:15hrs	Planned	T.G. shut due to raw material shortage
05.07.2010 to 06.07.2010	09:30 PM to 11:30 PM	27:00hrs	Un planned	T.G. supply stopped due to Boiler F.D. Fan impeller worn out
15.07.2010 to 16.07.2010	10:00 AM to 10:30 AM	24:30hrs	Un planned	T.G. supply stopped due to raw material shortage
26.07.2010 to 06.08.2010	12:00 PM to 03:00 PM	267hrs	Planned	Annual shut down Boiler & Plant
26.08.2010	11:45 AM to 12:00 AM	12.15hrs	Un-Planned	T.G. tripped (over speed) due to Governor problem
07.09.2010 to 15.11.2010	02:00 PM to 12:30 PM	191.30hrs	Planned	T.G. shut due to raw material shortage
28.11.2010 to 06.12.2010	10:40 AM to 02:30 PM	195.50hrs	Planned	T.G. shut due to raw material shortage
26.02.2011	04:30 PM to 10:00 PM	29:30hrs	Un-planned	Mechanical break down
12.04.2011 to 17.04.2011	04:00 AM to 07:00 AM	98:00hrs	Planned	Due to Raw Materials & Fuel Shortage
06.06.2011 to 06.06.2011	10:00 AM to 08:00 PM	10:00hrs	Planned	Due to Mechanical Maintenance
<b>Total</b>		<b>1185 hrs 47 mins</b>		

**B.2. Revision of the monitoring plan**

>> The monitoring plan has been revised and the revised monitoring plan has been approved. The Revised Monitoring Plan V02-10-03-2011, has been uploaded.

**B.3. Request for deviation applied to this monitoring period**

>> No request for deviation to this monitoring period.

**B.4. Notification or request of approval of changes**

>> No notification or request of approval of changes made.

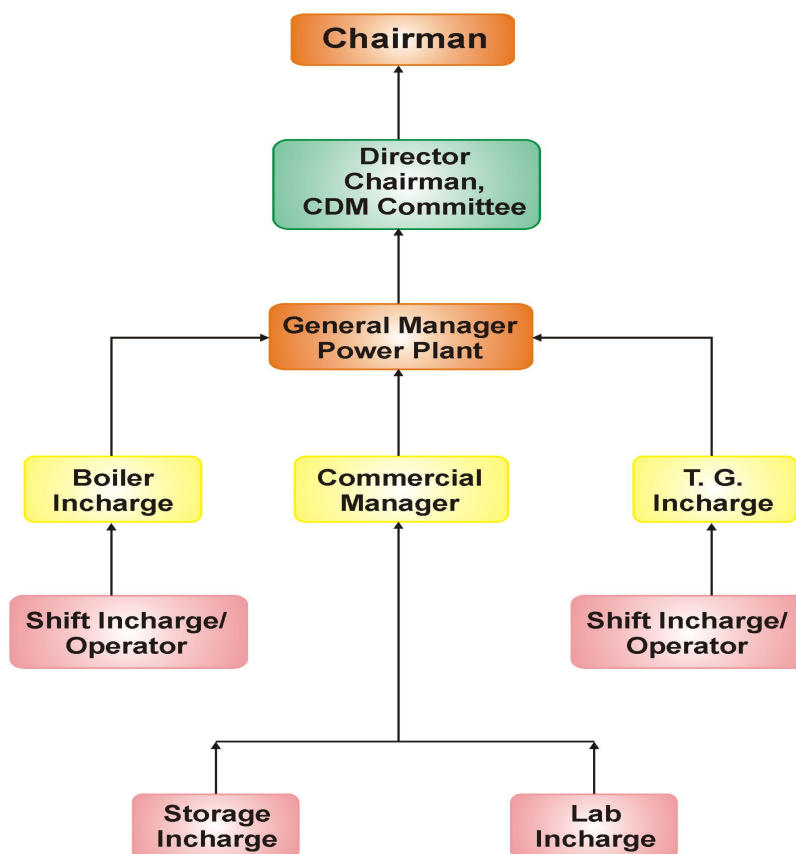
**SECTION C. Description of the monitoring system**

&gt;&gt;

**Description of Monitoring System Adopted**

In accordance with the monitoring plan provided in the registered PDD with reference to the project category type AMS-1.C. - Thermal Energy for the user with or without electricity Version 10, HAIL has implemented the monitoring system as per the approved plan:

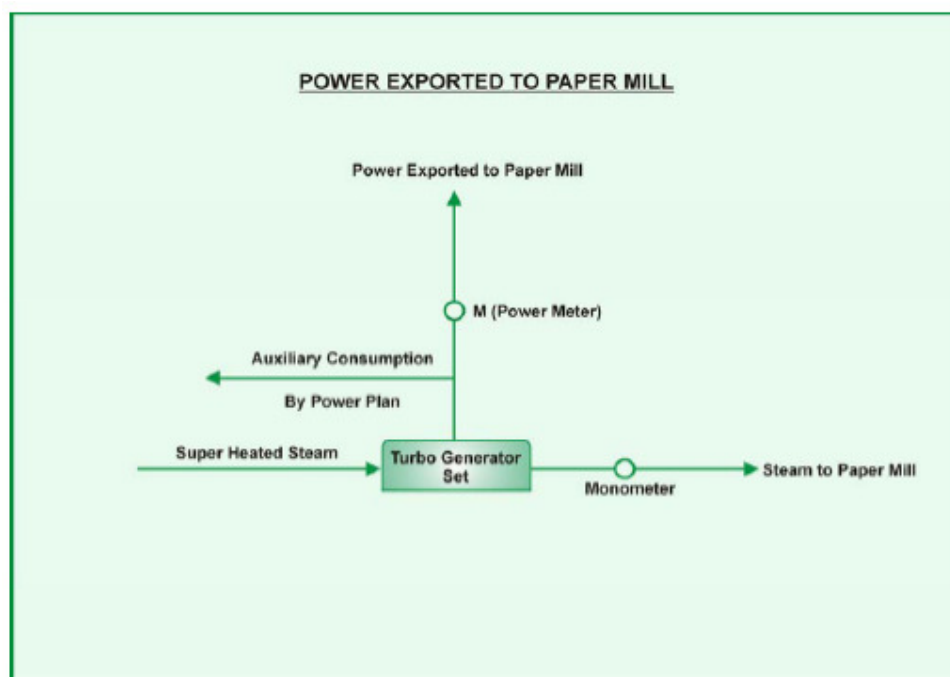
- i. “CDM Monitoring Team” was constituted as under:





- ii. Due training was imparted to CDM Monitoring Team Members on the entire process and procedures to be followed to monitor the emission reductions.
- iii. 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.
- iv. Data Logging system in accordance with the approved monitoring plan has been implemented.
- v. 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.
- vi. To ensure the quality of the monitoring system M/s Volition Business Solutions LLP, a competent management consulting firm, has been engaged to carry out internal audit on annual basis. Reporting requirements as per the Approved monitoring plan have been implemented and followed.
- vii. To check the corrective actions being taken for the errors or deficiencies reported from internal audit or verifications, system has been evolved.

#### **Schematic showing electrical power & steam output metering arrangements**



**SECTION D. Data and parameters****D.1 Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors**

Default values of following data have been used for calculating the baseline emission reductions, project emissions

**(i) Data used for calculation of Onsite Carbon Emission Reduction due to avoidance of use of fossil fuel**

<b>D.1.1</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	<b>NCV<sub>coal</sub></b>
Data unit:	TJ/kt
Description:	Calorific value of sub-bituminous coal
Source of data used:	2006 IPCC Guidelines for Natural Gas Inventories
Value(s) :	18.9
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Additional comment:	NIL

<b>D.1.2</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	<b>CO<sub>2</sub>EF<sub>coal</sub></b>
Data unit:	Tonne CO <sub>2</sub> per TJ
Description:	Baseline Emission Factor for sub-bituminous coal
Source of data used:	2006 IPCC Guidelines for Natural Gas Inventories
Value(s) :	96.10
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and Project emission calculations
Additional comment:	NIL

**(ii) Data used for calculation of Onsite Carbon Emission reduction by project activity due to displacement of electricity from Grid**

<b>D.1.3</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	<b>BEF<sub>e</sub></b>
Data unit:	Kg CO <sub>2</sub> per kWh
Description:	Baseline Emission Factor for Western Grid of India
Source of data used:	Baseline Carbon Dioxide Emission Database & User Guide - Version 3.0 Prepared by Central Electricity Authority, Government of India



Value(s) :	0.79 (Lower of Combined Margin Factor and Weighted Average Margin Factor)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Additional comment:	National Default Value provided by Central Electricity Authority, Government of India

**D.1.4 Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors**

*(Copy this table for each data and parameter. To report multiple values, a table may be used)*

<b>Data / Parameter:</b>	<u>η<sub>th</sub></u>
Data unit:	%
Description:	Boiler Efficiency
Source of data used:	Calculated on the basis of actual measured data during 2001 to 2006
Value(s) :	76.7%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Additional comment:	As per AMS-I.C. version 10 paragraph 13 (a), highest baseline boiler efficiency measured during last six years has been considered.

<b>Data / Parameter:</b>	<u>Q<sub>Biomass</sub></u>
Data unit:	TPA
Description:	Evaluation of Surplus Biomass within a range of 50 Km from plant site
Source of data used:	Secondary as well as primary data to be collected by the third party working in this field
Value(s) :	240103
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Any comment:	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**

Following parameters in accordance with the approved monitoring plan have been monitored at the site by means of accurately calibrated instruments and authentic procedure dedicated for the intended purposes.



<b>D.2.1</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	EG <sub>Gross</sub>
Data unit:	GWh
Description:	Total electricity generated from the project Activity.
Measured /Calculated /Default:	Measured
Source of data:	Measured data at Plant Site
Value applied:	18.56
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Gross Energy Meter Sensor: CONZERV Serial number: 82608/24069-4305 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Last Calibration: 21/08/2010
Measuring/ Reading/ Recording frequency:	Gross electricity generation had been measured through energy meter installed within the project boundary on continuous basis and the data had been recorded through PLC system and manual logging on hourly basis as per standard industrial norms. The data was compiled in daily register, then monthly and annual basis.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li> </ul>

<b>D.2.2</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	EG <sub>aux</sub>
Data unit:	GWh
Description:	Auxiliary Consumption by Power Plant
Measured /Calculated /Default:	Measured
Source of data:	Measured data at Plant Site
Value applied:	2.17
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type,	Auxiliary Energy Meter



accuracy class, serial number, calibration frequency, date of last calibration, validity)	Sensor: L&T Serial number: 08822803 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Last Calibration: 21/08/2010
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 through PLC system and manual logging on hourly basis as per standard industrial norms. The data was compiled in daily register, then monthly and annual basis.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose. and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis.</li> </ul>

<b>D.2.3</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	EG <sub>paper</sub>
Data 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 applied:	9.39
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Paper Machine Energy Meter Sensor: Cabs Electra Serial number: C- 15684 Calibration Frequency: Annually Calibrating agency: Power Service Electricals, Bangalore Date Of Last Calibration: 26/04/2011
Measuring/ Reading/ Recording frequency:	Electricity consumption in the paper machine had been measured through energy meter installed within the project boundary on continuous basis and data had been recorded through PLC system and manual logging on hourly basis as per standard industrial norms. The data was compiled in daily register, then monthly and annual basis.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated</li> </ul>



	for the intended purpose. and; ✓ Manager Plant will physically cross verify the data archives on monthly basis.
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<b>D.2.4</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	EG <sub>pulp</sub>
Data 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 applied:	6.99
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Paper Machine Energy Meter Sensor: Cabs Electra Serial number: C - 18817 Calibration Frequency: Annually Calibrating agency: Cabs Electra Industries Date Of Last Calibration: 29/01/2011
Measuring/ Reading/ Recording frequency:	Electricity consumption in the paper machine had been measured through energy meter installed within the project boundary on continuous basis and data had been recorded through PLC system and manual logging on hourly basis as per standard industrial norms. The data was compiled in daily register, then monthly and annual basis.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose. and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis.</li> </ul>

<b>D.2.5 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	EG <sub>y</sub>
Data 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 applied:	16.38
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N.A
Measuring/ Reading/ Recording frequency:	The data will be complied on daily register then monthly and annual basis
Calculation method (if applicable):	Calculated from $EG_{\text{paper}}$ and $EG_{\text{pulp}}$ on daily basis ( $EG_{\text{paper}} + EG_{\text{pulp}}$ ). The data will be complied on daily register then monthly and annual basis
QA/QC procedures applied:	For ensuring the accuracy of data the same can be cross checked from the value arrived at by deducting auxiliary consumption from the gross generation i.e. $EG_{\text{Gross}} - EG_{\text{aux}}$

**D.2.6 Data and parameters monitored***(Copy this table for each data and parameter. To report multiple values, a table may be used)*

<b>Data / Parameter:</b>	$Q_{\text{fc\_biomass}}$
Data 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 applied:	46796
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weigh Bridge: Make Avery Serial No.: 51-HY-L-105 Calibration frequency: Annual Calibrating agency: Weights & Measurements Dept., Office of the Legal Metrology Date of last calibration : 20/03/2010
Measuring/ Reading/ Recording frequency:	The Biomass quantity had been continuously measured electronically at Fuel Receiving Station and manual logging as per standard industrial norms. The supply of rice husk to the steam generation set had been monitored on daily basis.
Calculation method (if applicable):	N.A



applicable):	
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and</li> <li>✓ The monthly biomass consumption can be cross checked through biomass stock balance with reference to the Store receipts and biomass invoices.</li> </ul>

<b>D.2.7 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	$Q_{fc\ coal}$
Data 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 applied:	6961
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weigh Bridge : Make Avery Serial No.51-HY-L-105A Calibration frequency : Annually Calibrating agency: Weights & Measurements Dept. , Office of the Legal Metrology Date of last calibration : 12/03/2011
Measuring/ Reading/ Recording frequency:	The coal quantity was continuously measured through electronic measurement at fuel receiving station and manual logging of the data had been done as per standard industrial norms. The supply of coal to the steam generation set was monitored on daily basis.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and</li> <li>✓ The monthly coal consumption can be cross checked through coal stock balance with reference to the Store receipts and coal invoices.</li> </ul>

<b>D.2.8 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	$Q_{totalsteam}$
Data 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 applied:	208426
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Steam Flow Meter Make: ABB HART Serial number: FE - Steam Calibration Frequency: Annually. Calibrating agency: Premier Engineering and Electrical Corporation Date Of Last Calibration: 29/07/2010
Measuring/ Reading/ Recording frequency:	Steam generation had been measured through steam flow meter installed within the project boundary on continuous basis and Data had been recorded electronically through PLC system and spot readings of the steam generation was made on daily basis and recorded in logbook as per industrial norms.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li> </ul>

**D.2.9 Data and parameters monitored**

*(Copy this table for each data and parameter. To report multiple values, a table may be used)*

<b>Data / Parameter:</b>	$Q_{processsteam}$
Data 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 applied:	118436
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last	Steam Flow Meter Make: Endress+Hauser Serial number: C3015202000 Calibration Frequency: Annually.



calibration, validity)	Calibrating agency: Endress+Hauser Date Of Last Calibration: 26/03/2010
Measuring/ Reading/ Recording frequency:	Steam supplied to the paper and pulp section had been measured through steam flow meter installed within the project boundary on continuous basis and Data had been recorded electronically through PLC system and spot readings of the steam generation was made on daily basis and recorded in logbook as per industrial norms.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li> </ul>

<b>D.2.10 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	$P_{\text{processsteam}}$
Data unit:	Kg/cm <sup>2</sup>
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 applied:	10.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Pressure Gauge Make: ABB HART Serial number: FE - Steam Calibration Frequency: Annually. Calibrating agency: Premier Engineering and Electrical Corporation Date Of Last Calibration: 29/07/2010
Measuring/ Reading/ Recording frequency:	Pressure of the process steam was measured through PLC system and the data had been recorded manually in the log book on daily basis as per the standard industrial norms. The data was averaged on monthly basis and the monthly average value has been used to calculate the Steam Enthalpy.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li> </ul>



<b>D.2.11 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	t <sub>processsteam</sub>
<b>Data unit:</b>	°C
<b>Description:</b>	Pressure of process steam supplied per hour shall be maintained at Plant site in form of Shift Engineer's report
<b>Measured /Calculated /Default:</b>	Measured
<b>Source of data:</b>	Measured at Plant Site.
<b>Value applied:</b>	184.4
<b>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</b>	Baseline emission calculations
<b>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</b>	Temperature Gauge Make: H.Guru Serial number: HAI/TG-01 Calibration Frequency: Annually. Calibrating agency: Technomeasure Date Of Last Calibration: 17/04/2010
<b>Measuring/ Reading/ Recording frequency:</b>	Temperature of the process steam was measured through PLC system and the data had been recorded manually in the log book on daily basis as per the standard industrial norms. The data was averaged on monthly basis and the monthly average value has been used to calculate the Steam Enthalpy.
<b>Calculation method (if applicable):</b>	N.A
<b>-QA/QC procedures applied:</b>	<ul style="list-style-type: none"> <li>✓ As the data are critical in calculating emission reductions by project activity, these variables are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose and;</li> <li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li> </ul>

<b>D.2.12 Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	Steam Enthalpy
<b>Data unit:</b>	KJ/Kg
<b>Description:</b>	Heat value of process steam supplied to paper & pulp section
<b>Measured /Calculated /Default:</b>	Calculated
<b>Source of data:</b>	Calculated
<b>Value applied:</b>	2785
<b>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</b>	Baseline emission calculations



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The steam enthalpy had been calculated using the monthly average value of steam pressure and temperature through <a href="http://www.spiraxsarco.com/resources/steam-tables/saturated-steam.asp">http://www.spiraxsarco.com/resources/steam-tables/saturated-steam.asp</a>
Measuring/ Reading/ Recording frequency:	The steam enthalpy data is calculated monthly on the basis of monthly average value of temperature and pressure.
Calculation method (if applicable):	N.A
QA/QC procedures applied:	<ul style="list-style-type: none"><li>✓ As the data are critical in calculating emission reductions by project activity, the steam temperature and pressure are strictly monitored at the site by means of accurately calibrated instruments dedicated for the intended purpose</li><li>✓ As there is no condensate return, the enthalpy of process steam is the net enthalpy/heat supplied by the project activity</li><li>✓ Manager Plant will physically cross verify the data archives on monthly basis</li></ul>

**SECTION E. Emission reductions calculation****E.1. Baseline emissions calculation****>> A. Baseline Emission Reductions:****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 tCO<sub>2</sub>e.

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

$CO_2EF_{coal}$ : the CO<sub>2</sub> emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO<sub>2</sub> / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

$\eta_{th}$ : 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 ,

$BE_{el}$ : Carbon Emission reduction per annum by project activity due to displacement of electricity from Grid in t CO<sub>2</sub>

$EG_y$ : 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<sub>2</sub> per kWh

**iii. Total Baseline Emission reduction per annum by project activity (BE<sub>y</sub>)**

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

**E.2. Project emissions calculation****>> Onsite Project Emission expected from the Project Activity (PE<sub>y</sub>):**

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. Accordingly the project emissions in the form of tonnes CO<sub>2</sub> from combustion of coal is calculated using CO<sub>2</sub> emission factor refereeing the IPCC 2006 Guidelines for National Green House Gas Inventories. Formula used for calculation:



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

Where

$PE_y$  : Carbon-dioxide emission due to coal burning at project site in tCO<sub>2</sub>

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

$Q_{\text{fc}}$  : Quantity of coal burned in MT

$CO_2EF_{\text{coal}}$  : Baseline Emission Factor for sub-bituminous coal.

### E.3. Leakage calculation

#### >> Leakage (Ly)

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. Emission reductions calculation / table

#### >> Net Carbon Emission Reduction by project activity

$$ER_y = BE_y - PE_y - Ly$$

Where  $ER_y$  : Net Carbon Emission Reduction by project activity

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

$Ly$ : Project LeakageYear			2010	2011
Period from	Parameters	Units	01/01/2010 to 31/12/2010	01/01/2011 to 30/06/2011
<b>Operating Period – days</b>			<b>365</b>	<b>181</b>
<b>On site Carbon Emission Reduction due to avoidance of use of fossil fuel</b>				
Capacity of Existing Boiler (TPH)		TPH	<b>12</b>	<b>12</b>
Boiler Efficiency	h	%	<b>76.70%</b>	<b>76.70%</b>
Annual quantity of steam/heat supplied (MT)		MT	<b>124367</b>	<b>84059</b>
Steam Enthalpy		KJ/Kg	2785	2785
Annual quantity of steam/heat supplied (TJ)	$HG_y$	TJ	<b>346</b>	<b>234</b>
CO <sub>2</sub> Emission Factor for Sub-bituminous Coal	$CO_2EF_{\text{coal}}$	tCO <sub>2</sub> /TJ	96.1	96.1
<b>Baseline Emission Reduction in tCO<sub>2</sub> e</b>	<b><math>BE_y</math></b>	<b>tCO<sub>2</sub>e</b>	<b>33385</b>	<b>22497</b>
<b>On Site Project Emission Reductions due to displacement of electricity from the Grid</b>				
No of Operating days per Annum	$O_{\text{days}}$	Days	365	181
No of Operating Hours per Day	$O_{\text{hours}}$	Hrs	24	24
Gross Power Generation	$EG_{\text{gross}}$	GWh	<b>11.05</b>	<b>7.51</b>
Net Power Generation	$EG_y$	GWh	9.74	6.65
Emission Factor Considered	$BEF_e$	kgCO <sub>2</sub> /kWh	0.79	0.79
<b>Project Emission Reduction in tCO<sub>2</sub> e</b>	<b><math>BER_e</math></b>	<b>tCO<sub>2</sub>e</b>	<b>7694</b>	<b>5250</b>
<b>Total Emission Reductions (CER)</b>	<b><math>BE_y + BER</math></b>	<b>tCO<sub>2</sub>e</b>	<b>40979</b>	<b>27747</b>



	e			
<b>On Site Project Emissions</b>				
Qty of Coal consumed	$Q_{fc}$	MT	4147	2814
Calorific Value of Sub-bituminous Coal	$NCV_{coal}$	TJ/Kt	18.9	18.9
CO <sub>2</sub> Emission Factor for Sub-bituminous Coal	$CO_2EF_{coal}$	t CO <sub>2</sub> /TJ	96.1	96.1
<b>Project Emission in tCO<sub>2</sub> e</b>	<b>PE</b>	<b>tCO<sub>2</sub>e</b>	<b>7532</b>	<b>5111</b>
<b>Project Leakage in tCO<sub>2</sub> e</b>	<b>PL</b>	<b>tCO<sub>2</sub>e</b>	<b>0</b>	<b>0</b>
<b>Net Carbon Emission Reduction = CER-PE-PL</b>	<b>CERp</b>	<b>tCO<sub>2</sub>e</b>	<b>33447</b>	<b>22636</b>
Year	Net Carbon Emission Reduction in t CO <sub>2</sub>			
Jan 2010 - Dec 2010	33447			tCO <sub>2</sub> e
Jan 2011 - June 2011	22636			tCO <sub>2</sub> e
<b>Carbon Emission Reduction</b>	<b>56084</b>			<b>tCO<sub>2</sub> e</b>

#### E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

&gt;&gt;

Period	Estimated of overall emission reductions	Actual overall emission reductions
2010	32563	33447
2011	32563	22636
<b>Total (t CO<sub>2</sub> e)</b>	<b>65126</b>	<b>56084</b>

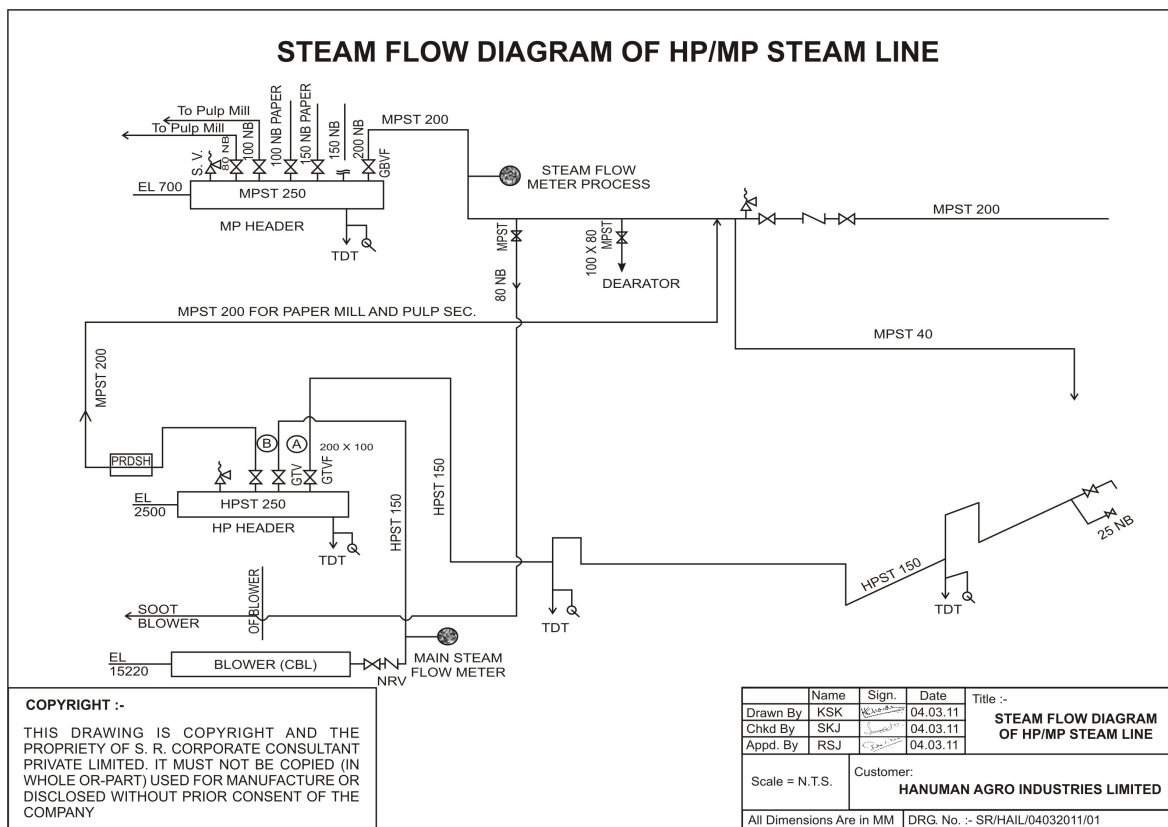
#### E.6. Remarks on difference from estimated value in the PDD

>> For the year 2011, the estimation was for the whole year 2011 whereas the actual data is for the period 01/01/2011 to 30/06/2011.

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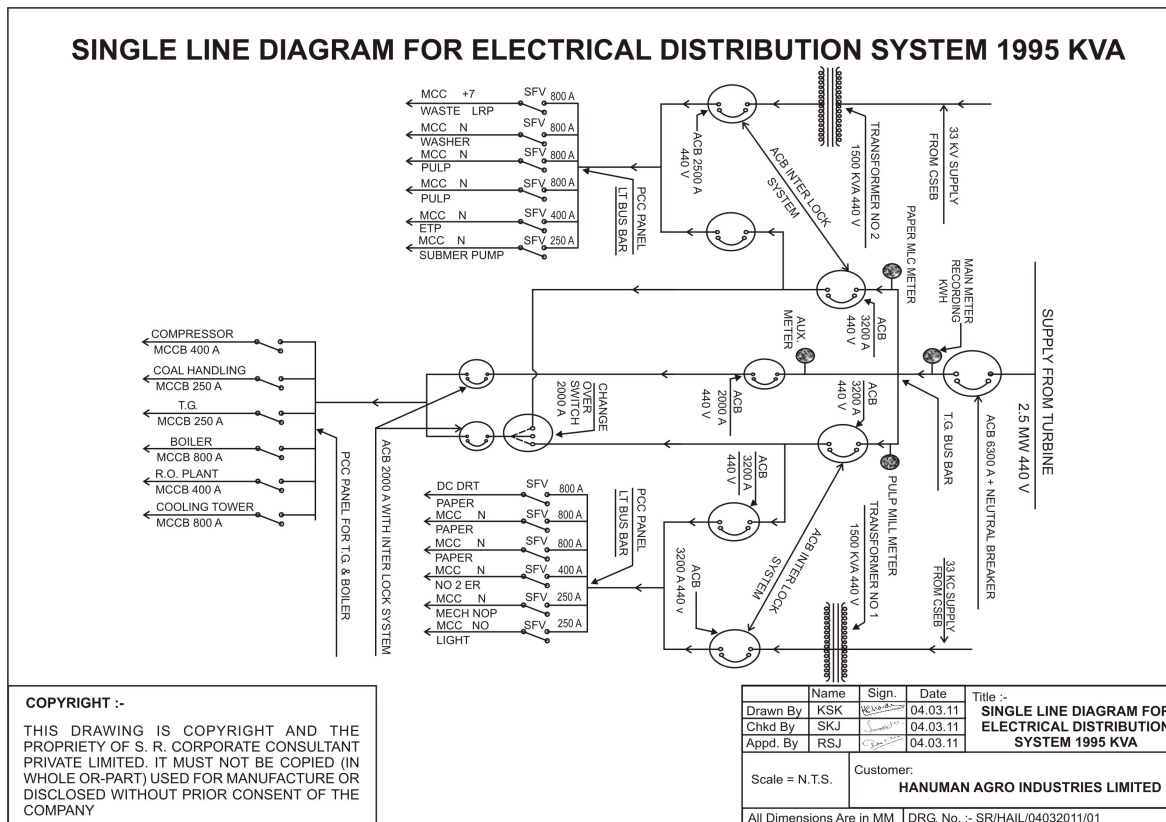


## Annex 1





## ANNEX 2





## History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Guideline, Form <b>Business Function:</b> Issuance		