MONITORING REPORT
version -02 date 20/09/2010

Project Title : SHYAM DRI WHR CPP
reference number : 1642
monitoring period- 01; dates from 25/03/2009 to 31/03/2010 (first and last days included)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

>>

The purpose of the proposed project activity is to generate electricity by generating steam using waste heat contained in the waste flue gases released from 2 numbers of ABC (After Burning Chamber) from two numbers of DRI (Direct Reduced Iron) sponge iron kiln having 350 TPD X 2 Nos. The heat contained in waste gases will be transferred to water which converts water in to steam in two numbers of WHRBs (Waste Heat Recovery Boilers 38tph each) producing aggregate 76 tph steam at 66 kg/cm2 pressure and 490±50C temperature to generate total 15 MW electricity from Waste Heat.

The purpose of the project activity is to achieve better energy efficiency, achieve sustainable development in the industry and improve the working environment of Sponge Iron-making process. The power so generated shall mainly be used to meet the captive power requirement of Shyam DRI Plant itself.

The net result is reduction in the demand of electricity from coal based captive power generation and resultant reduction in GHG emission

The following equipments were installed at the project activity:

S.No.	Major equipments	Specification		Commissioning date
1.	Waste Heat Recovery Boiler #1	Steam Generation Capacity	38 tph	02/06/2007
		Steam Temp.	490±5^{0}C	
		Steam Pressure	66 kg/cm^2	
2.	Waste Heat Recovery Boiler #2	Steam Generation Capacity	38 tph	20/06/2007
		Steam Temp.	490±5^{0}C	
		Steam Pressure	66 kg/cm^2	
3.	Coal based AFBC	Steam Generation Capacity	54 tph	01/05/2007
		Steam	490±5^{0}C	

		Temp.		
		Steam Pressure	67 kg/cm^2	
4.	STG	Power generation capacity	01/05/2007	01/05/2007
		Inlet steam flow	117 tph	
		Steam Temp.	485±5^{0}C	
		Steam Pressure	63.7 kg/cm^2	

The project started it's commercial production on 12/07/2007 by synchronization with grid.

This monitoring report includes the period 25/03/2009 to 31/03/2010, in this period project activity reduced about 96507 tCO_2.

A.2. Project Participants

>>

Name of the Party Involved (host) host party-	Private and/or Public entity (ies) Project Participant as applicable	Kindly indicate if the party involved wishes to be Considered as project participant (Yes/ No)
India (host) **Ministry of Environment and Forest**	**SHYAM DRI Power Ltd.-** Private entity	No

A.3. Location of the project activity:

>>

The company is located at Village:Pandloi & Nishanbanga P.O. Lapanga/Rengali, Sambalpur District, Orrisa State of India at Plot No. & Chaka No. 981/1293, 949/1295, 1231/1349, 986, 1001/1382 & 1231/1383 and Khatiar Sl.No.116/192 of PS-Kararbaga, about 35 KM from Sambalpur, Railway Station on State Highway No.10. Longitude= E 84^0 2'35" Latitude=N 21^0 40'50''

A.4. Technical description of the project

>>

WHRB based captive Power Plant at SHYAM DRI is proposed to utilize the heat content of flue gases coming out of ABC of sponge iron kiln. The Exhausted flue gases from rotary kiln shall be received at ABC for further incineration where the waste gas temperature likely to reach up to 950-1000^{0}C after ABC. No auxiliary fuel is fired in ABC. The generated quantity and the temperature of flue gases are influenced by a number of operating parameters of the sponge iron plant. At the best operating levels this waste heat shall produce producing aggregate 76 tph steam is generated at 66 kg/cm^2 pressure and 490^{0}C temperature. The WHRBs will be of single drum water tube with radiant chamber, along with

convective super heater, radiant super heater, economizer, de-super heater and hoppers for ash Collection as ash comes with flue gases.

The outlet boxes of the WHRB, leads to ESP to remove SPM from exhaust gases. The exhaust gas temperature shall be kept at 170^0C. The feed water temperature will be maintained at the inlet to economizer 105^0C.

The high pressure steam from WHRB (76 tonnes/hr) will be used to operate high efficiency extraction cum condensing multi stage STGs to generate 15 MW Electricity from WHRB.

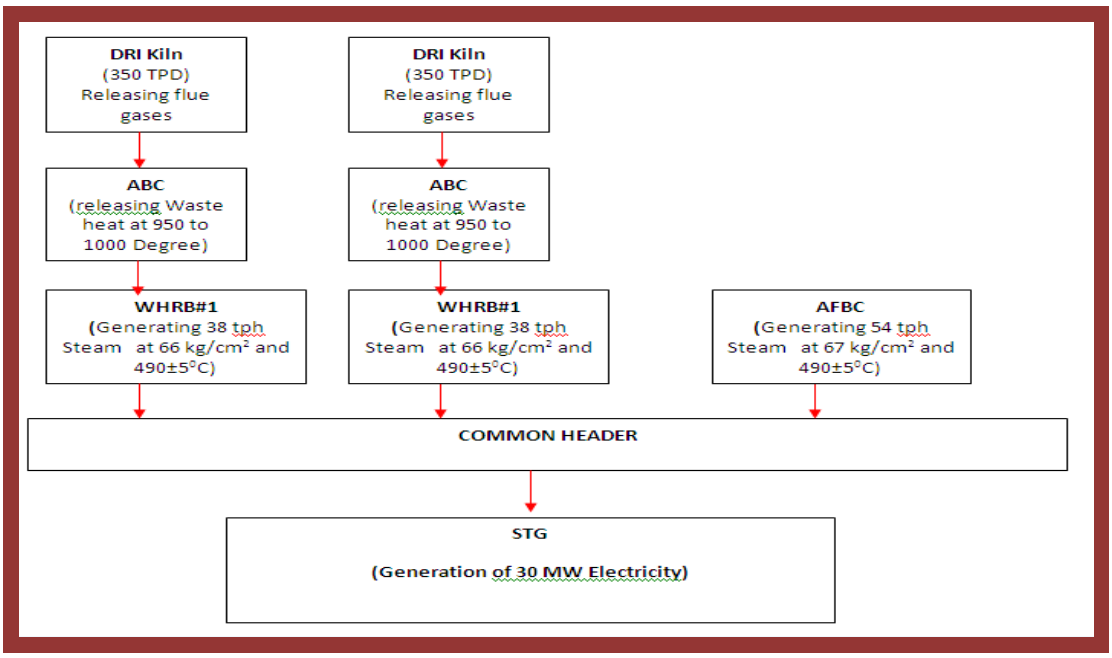
Ash collected from both WHRB hoppers & ESP will be conveyed pneumatically to ash silo. Other systems required are circulating water, De-mineralized water plant, Instrument Air Compressor and Exhaust Steam Condenser.

Steam from exhaust of STG rotor will be condensed in air cooled condenser.

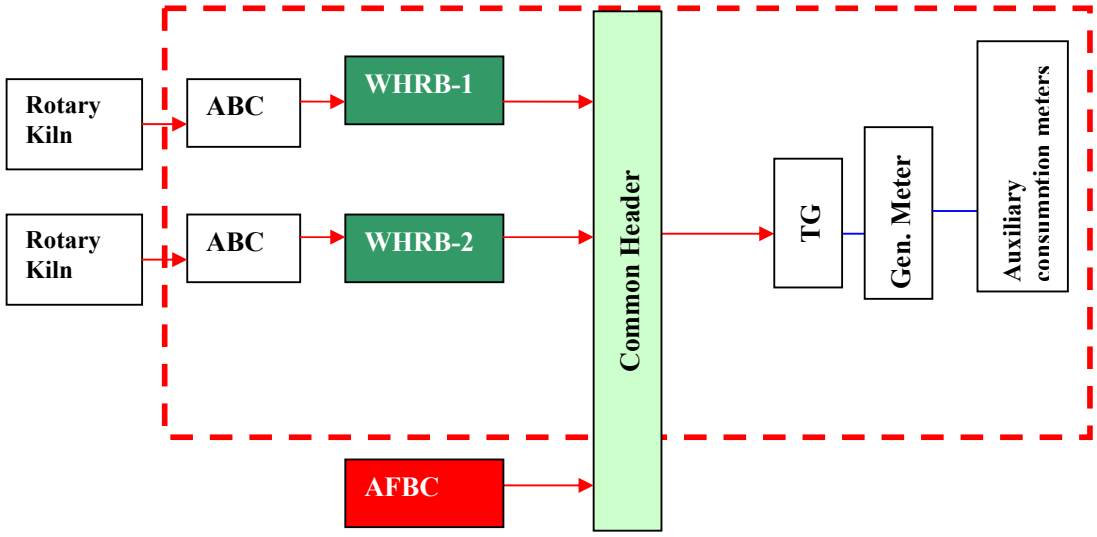
Only DM (De Mineralized) water will be used in boiler to avoid scale formation on boiler tubes. Total Waste water is recycled and reused after treatment. The generated power shall be used to meet the captive power requirement of the company.

The technology is environmentally safe and abides all legal norms and standards for SPM emissions.

Process Flow Diagram for power generation in Project Activity:



Project Boundary:



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

>>

Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation.ACM0004/ Version 02, Sectoral scope : 01, 3rd March 2006 and ACM0002 Sectoral scope : 01 of EB-36.

Tool for demonstration and assessment of additionality version-04 of EB-36

A.6. Registration date of the project activity:

>> 25/03/2009

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

>>

Start date of Crediting Period of the Project Activity	:	25/03/2009
Choice of Crediting Period	:	Fixed Crediting Period of 10 years
Monitoring Period	:	First Monitoring Period 25/03/2009 to 31/03/2010 (both days included)

There is no change in start date.

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

>>

Preparation of this document has been done by "Indus Technical and Financial Consultants Ltd.", whose address is :
Shri Lalit Kumar Singhania, Mr. Vikas Thakur
Indus Technical and Financial Consultants Ltd.
205, Samta Colony,
In front of Shikarpuri Panchayat Bhawan.
Raipur City , Chhattisgarh State . 492001. INDIA
Phone : +91 771-2255186 Fax : ++91 771-2254188, Email : indusryp@satyam.net.in ,
Mobile: +91 94252-08189, +91 93011-93400

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

>>

Project activity was implemented at single site whose coordinates are given in section A-3.

Project Activity is implemented in single phase and the major equipments commissioning dates are as given section A.1.

The commercial power generation is started on 12/07/2007 by synchronization with grid.

The shutdown history is as follows:

KILN-1 SHUTDOWN DETAIL			
S/No.	**Shutdown Reason**	**Date of S/D**	**Date of R/S**
1	Periodical Maintenance due to campaign life	02.01.2009	11.01.2009
2	Periodical Maintenance due to campaign life	8.04.2009	26.04.2009
3	Periodical Maintenance due to campaign life	27.06.2009	8.07.2009
KILN-2 SHUTDOWN DETAIL			
S/No.	**Shutdown Reason**	**Date of S/D**	**Date of R/S**
1	Periodical Maintenance due to campaign life	29.01.2009	11.02.2009
2	Periodical Maintenance due to campaign life	25.04.2009	04.05.2009
3	Periodical Maintenance due to campaign life	03.10.2009	12.10.2009

TRIPPING HISTORY OF BOILERS AND TG:

S.No.	Equipment	Total Tripping hours in monitoring period
1	WHRB#1	1679 Hours
2.	WHRB#2	2805 Hours
3.	AFBC	940 Hours
4.	TG	226 Hours

There is no exchange or replacement of major equipments taken place during this period.

There is no event occurred during the monitoring period which may impact the applicability of methodology.

B.2. Revision of the monitoring plan

>> There has been no revision in monitoring plan.

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

>> There is No request for deviation in Monitoring Period

B.4. Notification or request of approval of changes

>> Not Applicable

SECTION C. Description of the monitoring system

>>

1.0	**GHG Performance Parameter**
1.1	The monitoring protocol requires SHYAM DRI to monitor the following GHG Performance parameters for estimating the emissions reductions from the waste heat based CPP: • Gross generation of electricity by the CPP • Auxiliary consumption • Net quantity of steam available from the waste heat recovery boiler (WHRB-1&2) for electricity generation in CPP. • Total Steam availability to and consumed in TG sets. • Temperature and pressure of steam from WHRB boiler. • Net electricity generation from waste heat recovery. • Gross quantity of power imported and or exported from and to the grid.
2.0	**Metering System**
2.1	The metering system for the waste heat based CPP consist of • Internal metering system calibrated and sealed by Deputy Electrical Inspector Generation for metering total generation from each TG Set. • In house metering system of SHYAM DRI for metering the generation of power, auxiliary consumption, • Steam Flow meters for monitoring net steam flow from WHRB-1 & 2 after the vent before the common header at entry port. • Flow meter for steam inlet to turbine TG. • Temperature gauge for WHRB-1&2, boiler. • Pressure gauge for WHRB-1 & 2 boiler.
	The two numbers TG meters are located in the TG room itself. They are used to monitor SHYAM DRI's net electricity and total generation from the CPP. These meters are maintained and calibrated by SHYAM DRI. All these meters are cross calibrated from standard testing laboratory Govt of Orissa, Bhubaneshwar and sealed by DEI(G).
2.2	**In house Metering System of SHYAM DRI** SHYAM DRI has an in-house metering system, which monitors the overall performance of the waste heat based CPP. The metering system mainly comprises of three meters. • 1 in-house generation meter- One for TG set. • In-house Auxiliary consumption meter. (one) The in-house generation meters (or the Energy Meter) and consumption meters are micro-processor based metering device which monitor the net unit of Energy generated and auxiliary electricity consumed by SHYAM DRI's CPP. In-house captive auxiliary power consumption meters (or the Kilowatt Hour meter) are mainly micro-processor based metering device. In case or requirement the SHYAM DRI may also install the normal energy meters at various location. The number and place of metering can be changed to suit the actual field requirement. Installation of all such meters will be well documented. All the meters will be calibrated from the reputed agencies.

3.0	**Calibration of the Metering System**
3.1	All the metering devices are calibrated at regular intervals so that the accuracy of measurement is ensured all the time. The meters recording total generation is calibrated by standard testing laboratory Govt of Orissa, Bhubaneshwar and sealed by DEI(G). The other meters are calibrated internally as per suppliers calibration schedule following the standard procedures for calibration.
4.0	**Reporting of the Monitored Parameters/ Authority and Responsibility of monitoring and reporting**
4.1	**Metering System** The SHYAM DRI personnel read the power generation from metering system for recording the net electricity and the total generation from the CPP on the last day of every month or First day of the subsequent month and keep the complete and accurate records for proper administration. In case of requirement the accuracy of the main meter reading may be substantiated by the check meter reading. In the event that the main meter is not at service, then the check meter shall be used. A monthly report is prepared based on the meter readings, which is sent to the Electrical Inspector as monthly legal return. The Shift Engineer (Electrical) takes daily reading (at 6.00 AM) of the Main meters of the metering system and keeps the complete and accurate records in the reading book (maintained at the plant) for proper administration. The reading are verified by the Manager (Electrical and Instrumentation) on a daily basis and sent to the General Manager (Plant) at the Administrative Building in the plant for his review and for preparing the daily report. The import & export of power shall be monitored on monthly basis by the Grid authorities and the PP.
4.2	**In-house Metering System of SHYAM DRI** The Shift Engineer (Electrical) monitors shift wise and eight hourly data on total generation, auxiliary consumption, net electricity available. The shift data or eight hourly data are recorded in the log book. The complete and accurate records in the log book are signed by the Shift Engineer (Electrical). Both of these reports are sent to the Manager (Electrical & Instrumentation) for his review on a daily basis. On the basis of the reported parameters, a complete and accurate executive daily summary report is prepared and signed by the General Manager (Electrical & Instrumentation) and sent to the unit head for proper administration. The flow meter reading, temperature and pressure gauge and DCS will measure the respective parameters and reporting is done shift wise by shift in-charge (operations) based on the online measurements.
5.	**Uncertainties and Adjustments:**
5.1	The shift wise or eight hourly, daily and monthly data are recorded at various points as stated above. Any observations (like inconsistencies of reported parameters) and/or discrepancies in the operation of the power plant will be documented as "History" in the daily report prepared by the General Manager (Plant) along with its time of occurrence, duration and possible reasons behind such operational disruptions. Necessary corrective actions will be undertaken at the earliest. Any discrepancies in the Main reading for example, difference between main meter and check meter reading or extreme deviation in the net generation figure, if identified, will immediately be brought to the notice of General Manager, as well

	as Electrical Inspector. Corrective actions to be undertaken at the earliest after identification of reason of such discrepancy. Furthermore, as a safety measure, the total power generating system is equipped with an Automatic Alarming System which gives a prior indication of any fluctuations in the operating parameters of the power plant thereby enabling the operators to take necessary preventive measures. These measures will be undertaken in order to detect and minimize the uncertainty levels in data monitoring.
6.0	**Experience and Training**
6.1	All the Shift Engineers (Electrical and Instrumentation, Operations) are qualified engineers/ technologists. All the operators of the boiler power plant are IBR certified and NPTI certified engineers, and they also undergo an exhaustive on-the-job training program including plant operations, data monitoring and report preparation.
6.2	**Emergency Preparedness Plan** The total power generating system of the waste heat based CPP is equipped with an "Automatic Alarming System" which helps the operators to take necessary preventive actions before any kind of non-functioning of the power plant results in. SHYAM DRI. CPP has a fire fighting system in place. In addition SHYAM DRI has standard procedures for tackling emergencies arising from • Blackout • Low boiler drum level/ low feed water level • High flue gas temperature from sponge iron kiln. • Load throw off • Boiler Tube leakage. • Boiler tripping at alarm systems.
(f)	**Reference** Project Design Document, maintenance manuals and standard OEM procedures.
	Records 1. Log Book, maintained by electrical & instrumentation department at site, containing daily data for all the in-house metering system. 2. Daily Executive Summary submitted to the Vice president/General Manger (Plant), prepared by electrical & instrumentation department at site containing daily data for all the in-house metering system and record of any history with details. 3. Daily report containing the performance parameters of the power plant and record of any history with details, maintained at site with a copy being sent to the unit head of the SHYAM DRI . 4. Monthly Report on net quantity of electricity generated at SHYAM DRI's Captive Power Plant and Electricity Duty returns submitted by SHYAM DRI on generation archived at

		site with a copy being sent to the unit head of SHYAM DRI. Monthly report shall contain the gross quantity of power imported and/or exported by the facility
	5.	Calibration certificate of the meters maintained at site.

(A) Purpose

To define the procedures and responsibilities for GHG Performance, Project Management , Registration, Monitoring, Measurement and Reporting of data and dealing with uncertainties.

(B) Scope

This procedure is applicable to 15 MW waste heat based i.e. WHRB power project of SHYAM DRI, India.

(C) Authorities and Responsibilities of Project Management, Registration, Monitoring, Measurement and Reporting:

Shift Engineer (Operations): Responsible for reporting shift wise or eight hourly data of the steam generated from boilers, steam fed to turbines, parameters of steam and flow meter reading of the Captive Power Plant. The report is then sent to the Manager (O & M) for his review.

Manager/Sr. Manager (O&M) : Responsible for reviewing the monitored parameters on an eight hourly or shift based and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant).

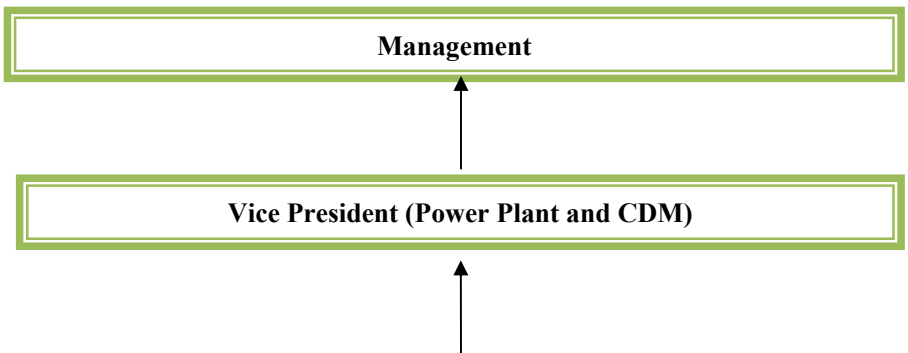
Shift Engineer (Electrical): Responsible for taking meter reading for electricity generation and wheeling shift-wise. The report is then sent to the Manager (E&I) for his review on a daily basis.

Manager/Sr. Manager (E&I): Responsible for reviewing the monitored parameters shift-wise and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant). Also responsible for the monthly joint meter reading for the import and or export of power from the facility from and to the grid.

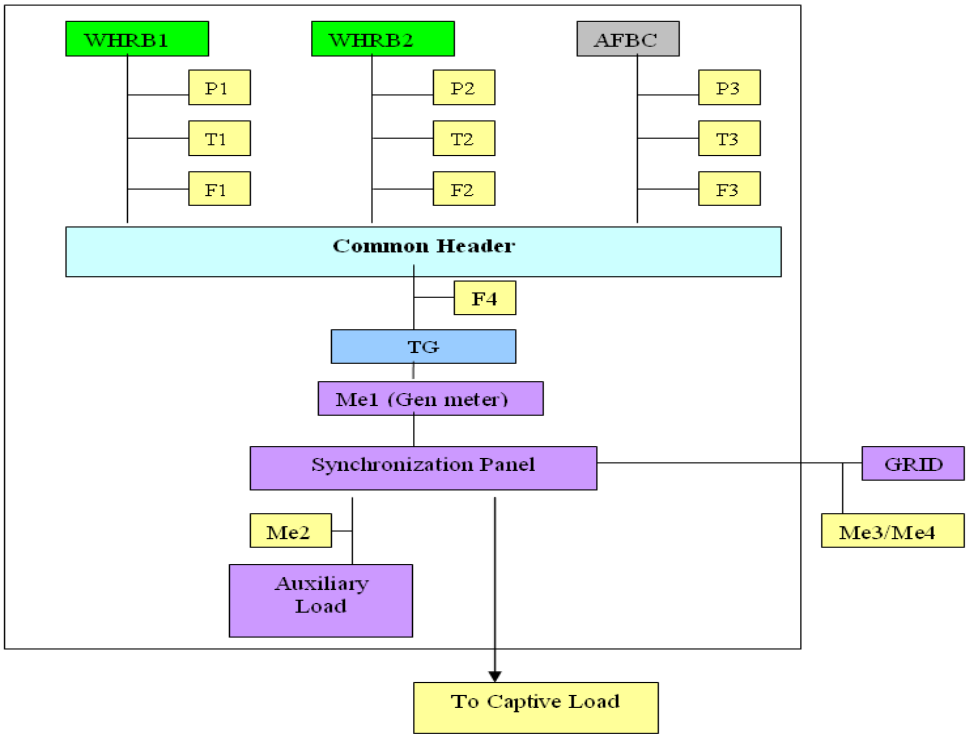
General Manager / Vice President (Plant): Responsible for summarizing data of Electrical, Mechanical, Process (/operation) Departments and report the same to the Vice President (Power) and CMD (SHYAM DRI) on a daily basis.

Institutional arrangement for recording and record keeping

Organisation Chart



Schematic Drawing and Details of Monitoring Plan and Metering Points :



Steam Monitoring Parameter	Metering Point
Pressure at Outlet of WHRB-1	P_1
Pressure at Outlet of WHRB-2	P_2
Pressure at Outlet of AFBC	P_3
Temperature of Outlet of WHRB-1	T_1
Temperature at Outlet of WHRB-2	T_2
Temperature at Outlet of AFBC	T_3
Flow of steam at Outlet of WHRB-1 (after vent)	F_1
Flow of steam at Outlet of WHRB-2 (after vent)	F_2
Flow of steam at Outlet of AFBC (after vent)	F_3
Net of Flow of steam in to TG	F_4

Electrical Parameter

Electrical Monitoring Parameter	
Gross Power Generation from TG	Me_1
Auxiliary consumption meter	Me_2
Gross quantity of Power Imported from the Grid(EG_{IMPORT}[1])	Me3
Gross quantity of Power Exported to the Grid(EG_{EXPORT})[6]	Me4

[1] Me3 and Me4 data will be recorded normally by a single meter having facility to record import of power and export of power.

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	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data / Parameter:	$EFCO_2$ i
Data unit:	t C/TJ
Description:	CO_2 emission factor of fuel used in captive power generation
Source of data used:	IPCC guidelines
Value(s) :	26.2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	IPCC value give conservative emission factor for Baseline Emission.
Additional comment:	Nil

Data / Parameter:	$EF_{captive, y}$
Data unit:	$tCO_2eq./MWh$
Description:	Emission factor for captive power generation
Source of data used:	Calculated
Value(s) :	1.26
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data has been calculated as required by methodology ACM 0004 Version-2 assuming boiler efficiency as 100% as per Option B of methodology to be conservative for baseline Emission.
Additional comment:	Nil

D.2. Data and parameters monitored	
(Copy this table for each data and parameter. To report multiple values, a table may be used)	
Data unit:	MWh
Description:	Gross electricity generated by entire CPP ($EG_{GEN\ CPP}$)
Measured /Calculated /Default:	Measured
Source of data:	Data is measured through the electronic meter provided at the output of TG.
Value(s) of monitored parameter:	174044
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	Accuracy class	Serial Number	Calibration frequency	Date of last calibration	Validated
Electronic Energy	0.5 class	6607878	Yearly	26/03/2010	25/03/2011

	Metter
Measuring/ Reading/ Recording frequency:	The data is measured continuously through electronic energy meter, the date is recorded on eight hourly basis in logbook, Logbook is signed by plant manager daily.
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meters are calibrated regularly. The meters are regularly under QC/QA procedure for any variation. If variation noticed the recalibration is done immediately.

Data unit:	MWh
Description:	Auxiliary electricity consumption ($EG_{AUX\ CPP}$)
Measured /Calculated /Default:	Measured
Source of data:	Data is measured through the electronic meters provided at the feed to each auxiliary consumption source. The meters readings is summed up to arrive total auxiliary consumption. This data is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report
Value(s) of monitored parameter:	18143
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

S. No.	Type	Accu-racy class	Serial Number	Calibra-tion freque-ncy	Date of last calibration	Validated
1	Electronic Energy Metter	1	98001/2-2406	Yearly	25/11/2009	24/11/2010
2	Electronic Energy Metter	1	98001/3-2406	Yearly	25/11/2009	24/11/2010

Measuring/ Reading/ Recording frequency:	Logbook is signed by plant manager daily. Meters are calibrated regularly. The meters are regularly under QC/QA procedure for any variation. If variation noticed the recalibration is done immediately.
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meters are calibrated on regular basis (once in year).

Data unit:	MWh
Description:	Net electricity generated by entire CPP ($EG_{y\ CPP}$)
Measured /Calculated /Default:	Calculated

Source of data:	calculated EG y CPP =EG GEN CPP -EG AUX CPP
Value(s) of monitored parameter:	155901
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated
Measuring/ Reading/ Recording frequency:	The data is measured continuously through electronic energy meter, the date is recorded on eight hourly basis in logbook, Logbook is signed by plant manager daily.
Calculation method (if applicable):	EG y CPP =EG GEN CPP -EG AUX CPP.
QA/QC procedures applied:	Calculated based on measured data.

Data unit:	MWh
Description:	Gross electricity generation due to WHRB (E_{GEN})
Measured /Calculated /Default:	Calculated
Source of data:	calculated based on measured data.
Value(s) of monitored parameter:	85246
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Calculated by multiply the "% Contribution of Enthalpy of Steam from WHRB" to "Gross Electricity Generated by TG(E_{GEN})"
QA/QC procedures applied:	Calculated based on measured data.

Data unit:	MWh
Description:	Auxiliary electricity consumption for WHRB electricity generation (E_{AUX})
Measured /Calculated /Default:	Calculated
Source of data:	calculated based on measured data.
Value(s) of monitored parameter:	8914

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Calculated by multiply the "% Contribution of Enthalpy of Steam from WHRB" to "Auxiliary Electricity consumption by entire CPP(E_{AUX})"
QA/QC procedures applied:	Calculated based on measured data.

Data unit:	MWh
Description:	Net electricity generated due to WHRB (EGy)
Measured /Calculated /Default:	Calculated
Source of data:	calculated
Value(s) of monitored parameter:	76593
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Calculated : EG y = E_{GEN} – E_{AUX}
QA/QC procedures applied:	Calculated based on measured data.

Data unit:	^{0}C
Description:	Temperature of steam at outlet of WHRB-1, WHRB-2 and AFBC (Steam Temp.(T1, T2 & T3)
Measured /Calculated /Default:	Measured
Source of data:	The temperature meters are provided at the output of WHRB-1, WHRB-2 and AFBC. The meter readings are available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report
Value(s) of monitored parameter:	490

<table>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emission</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th>Type</th><th>Accu-racy class</th><th>Serial Number</th><th>Calibra-tion frequ-ency</th><th>Date of last calibration</th><th>Validated</th></tr>
<tr><td colspan="6">Temperature meter of WHRB-1</td></tr>
<tr><td>Temp. Transmitter</td><td>0.1%</td><td>231360</td><td>Yearly</td><td>27/12/2009</td><td>26/12/2010</td></tr>
<tr><td colspan="6">Temperature meter of WHRB-2</td></tr>
<tr><td>Temp. transmitter</td><td>0.1%</td><td>231361</td><td>Yearly</td><td>27/12/2009</td><td>26/12/2010</td></tr>
<tr><td colspan="6">Temperature meter of AFBC</td></tr>
<tr><td>Temp. transmitter</td><td>0.1%</td><td>250454</td><td>Yearly</td><td>27/12/2009</td><td>26/12/2010</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>The data is measured continuously through temperature transmitter, reading is available at DCS, DCS data will used in logbook.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Measured</td></tr>
<tr><td>QA/QC procedures applied:</td><td>Meters are calibrated regularly.</td></tr>
</table>

<table>
<tr><td>Data unit:</td><td>Kg/cm^2</td></tr>
<tr><td>Description:</td><td>Pressure of steam at outlet of WHRB-1 and WHRB-2 (Steam Pressure (P1, P2))</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>The steam pressure gauge are provided at the output of WHRB-1, WHRB-2. The meter readings are available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>66</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emission</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th>Type</th><th>Accu-racy class</th><th>Serial Number</th><th>Calibration frequency</th><th>Date of last calibration</th><th>Validated</th></tr>
<tr><td colspan="6">Pressure gauge of WHRB-1</td></tr>
<tr><td>Pressure Gauge</td><td>0.1%</td><td>231388</td><td>Yearly</td><td>28/12/2009</td><td>27/12/2010</td></tr>
<tr><td colspan="6">Temperature meter of WHRB-2</td></tr>
<tr><td>Pressure</td><td>0.1%</td><td>231391</td><td>Yearly</td><td>28/12/200</td><td>27/12/201</td></tr>
</table>
</td></tr>
</table>

	Gauge | | | | 9 | 0
Measuring/ Reading/ Recording frequency:	The data is measured continuously through pressure gauge, reading is available at DCS, DCS data will used in logbook.
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meters are calibrated regularly.

Data unit:	Kg/cm^2
Description:	Pressure of steam at outlet of AFBC (Steam Pressure (P3))
Measured /Calculated /Default:	Measured
Source of data:	The steam pressure gauge are provided at the output of AFBC. The meter readings are available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report
Value(s) of monitored parameter:	67
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type | Accu-racy class | Serial Number | Calibration frequency | Date of last calibration | Validated Pressure Gauge | 0.1% | 250454 | Yearly | 28/12/2009 | 27/12/2010
Measuring/ Reading/ Recording frequency:	The data is measured continuously through pressure gauge, reading is available at DCS, DCS data will used in logbook.
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meters are calibrated regularly.

Data unit:	Tonnes per hour
Description:	Steam flow at outlet of WHRB-1 and WHRB-2 (Steam Flow (F1, F2))
Measured /Calculated /Default:	Measured
Source of data:	The steam flow meters are provided at the output of WHRB-1, WHRB-2. The meter readings are available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report
Value(s) of monitored parameter:	192980.50 , 170268.00
Indicate what the data are used for (Baseline/ Project/ Leakage emission	Baseline emission

<table>
<tr><td>calculations)</td><td></td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th>Type</th><th>Accu-racy class</th><th>Serial Number</th><th>Calibration frequency</th><th>Date of last calibration</th><th>Validated</th></tr>
<tr><td colspan="6">Steam Flow meter of WHRB-1</td></tr>
<tr><td>Flow Trans-mitter</td><td>0.1%</td><td>231407</td><td>Yearly</td><td>29/12/2009</td><td>28/12/2010</td></tr>
<tr><td colspan="6">Steam Flow meter of WHRB -2</td></tr>
<tr><td>Flow Trans-mitter</td><td>0.1%</td><td>231408</td><td>Yearly</td><td>28/12/2009</td><td>27/12/2010</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>The data is measured continuously through flow meter, reading is available at DCS, DCS data will used in logbook.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Measured</td></tr>
<tr><td>QA/QC procedures applied:</td><td>Meters are calibrated regularly.</td></tr>
</table>

<table>
<tr><td>Data unit:</td><td>Tonnes per hour</td></tr>
<tr><td>Description:</td><td>Steam flow at outlet of AFBC (Steam Flow (F3))</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>The steam flow meter is provided at the output of AFBC. The meter reading is available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>394543.40</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emission</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th>Type</th><th>Accu-racy class</th><th>Serial Number</th><th>Calibration frequency</th><th>Date of last calibration</th><th>Validated</th></tr>
<tr><td>Flow Trans-mitter</td><td>0.1%</td><td>259457</td><td>Yearly</td><td>29/12/2009</td><td>28/12/2010</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>The data is measured continuously through flow meter, reading is available at DCS, DCS data will used in logbook.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Measured</td></tr>
<tr><td>QA/QC procedures applied:</td><td>Meters are calibrated regularly.</td></tr>
</table>

Data unit:	Tonnes per hour
Description:	Steam flow at inlet of TG (Steam Flow (F4))
Measured /Calculated /Default:	Measured
Source of data:	The steam flow meter is provided at the input of TG. The reading is available on DCS continuously and same is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report
Value(s) of monitored parameter:	740308.80
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	*Accuracy class*	*Serial Number*	*Calibration frequency*	*Date of last calibration*	*Validated*
Flow Transmitter	0.1%	292898	Yearly	29/12/2009	28/12/2010

Measuring/ Reading/ Recording frequency:	The data is measured continuously through flow meter, reading is available at DCS, DCS data will used in logbook.
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meters are calibrated regularly.

Data unit:	MWh
Description:	Gross electricity imported from Grid. (EG_{IMPORT})
Measured /Calculated /Default:	Measured
Source of data:	Data is measured through the electronic meter provided at the substation of the facility where the interface with the grid is established. The monthly Joint Meter Reading is available at plant. The meter is regularly calibrated by approved agencies.
Value(s) of monitored parameter:	14672.73
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	Accuracy class	Serial Number	Calibration frequency	Date of last calibration	Validated
Electronic Energy	0.2%	WSC 26713	Yearly	10/12/2009	09/12/2010

	meter
Measuring/ Reading/ Recording frequency:	Continuous measured
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meter is sealed by grid authority and calibrated at required interval as per prevailing law of grid.

Data unit:	MWh
Description:	Gross electricity exported from Grid (EG_{EXPORT})
Measured /Calculated /Default:	Measured
Source of data:	Data is measured through the electronic meter provided at the substation of the facility where the interface with the grid is established. The monthly Joint Meter Reading is available at plant. The meter is regularly calibrated by approved agencies.
Value(s) of monitored parameter:	29698.43
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	Accu-racy class	Serial Number	Calibration frequency	Date of last calibration	Validated
Elec-tronic Energy meter	0.2%	APM03642	Yearly	22/01/2010	21/01/2011

Measuring/ Reading/ Recording frequency:	Continuous measured
Calculation method (if applicable):	Measured
QA/QC procedures applied:	Meter is sealed by grid authority and calibrated at required interval as per prevailing law of grid.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

We have followed the approved baseline methodology ACM0004 for formulas used is estimating base line emissions:

If the baseline scenario is determined to be captive power generation either (existing or new), the

Emissions factor for displaced electricity is calculated as follows;

Calculation of emission factor for captive power baseline:

$EF_{captive, y} = EFCO_2,i / Eff_{captive}$ X 44/12 X 3.6 TJ/1000 MWh

Where.

$EF_{captive, y}$	:	Emission factor for captive power generation (tCO_2/MWh)
$EFCO_2,I$	:	CO_2 emission factor of fuel used in captive power generation tC/TJ
$Eff_{captive}$	:	Efficiency of captive power generation (%)
44/12	:	Carbon to Carbon Dioxide conversion factor
3.6/1000	:	TJ to MWh conversion factor

To estimate boiler efficiency, project participants may chose between the following two options

Option A
1. Measured efficiency prior to project implementation
2. Measured efficiency during monitoring.
3 Manufacturers nameplate data for efficiency of existing boilers

Option B
Assume a boiler efficiency of 100% based on the net calorific values as a conservative approach

We have selected Option B

Calculation of Net Power Generation:

A	Calculation of Enthalpy of Steam fed from WHRB-1 (H1)	=	Ent X F1 = H1	652048765477.41	KJ
B	Calculation of Enthalpy of Steam fed from WHRB-2 (H2)	=	Ent X F2 = H2	575831116455.57	KJ
C	Total Enthalpy of Steam fed from WHRB-1 & 2 (H5)	=	A + B = H5	1227879881932.98	KJ
D	Calculation of Enthalpy of Steam fed from AFBC (H3)	=	Ent X F3 = H3	1333627593869.95	KJ
E	Calculation of Enthalpy of steam fed to TG (H4)	=	Ent X F4 = H4	2499246270770.45	KJ
F	Electricity Generated by TG (EG GEN CPP)	=	Me1	174044.00	MWh
G	Auxiliary Consumption by CPP(EGAUX CPP)	=	Me2	18142.00	MWh
H	Net Electricity generation by CPP (EG y CPP)	=	F-G	155902.00	MWh

I	Proportional Percentage Contribution in Enthalpy of Steam from WHRB-1 & 2 in total enthalpy of steam used for power generation by TG = Enthalpy of Steam from [(WHRB 1 &2 / Total Enthalpy of steam fed into TG) X 100]	=	(C/E) X 100	0.491300076	
J	Electricity Generation from WHRB = % Contribution of Enthalpy of Steam from WHRB X Gross Electricity Generated by TG(EGEN) = F X I	=	F X I	85507	MWh
K	Auxiliary Electricity consumption by WHRB (E_{AUX})	=	G X I	8914	MWh
L	Net Electricity generated by WHRB (EGy)	=	J-K or (H x I)	76593	MWh

Note : (1) Steam enthalpy E_{nt} in K Cal/Kg is arrived by using thermodynamic steam tables, Based on the pressure and temperature readings.
(2) Since the temperature and pressure at TG inlet are maintained at same level as that of WHRB-1& 2 outlet, hence separate monitoring of temperature and pressure at TG inlet is not required.

The total emission reduction for the project activity for the period of 25-3- 2009 to 31-Mar-2010 is 96507 tCO_2.

E.2. Project emissions calculation

>>

Project Emission (PEy)

PE y = No Project Emission is considered
= 0 tCO_2/annum

E.3. Leakage calculation

>>

There is no leakage in the project activity

LE y = Leakage is considered
= 0 tCO_2/annum

E.4. Emission reductions calculation / table

>>

Emission Reductions
Emission Reduction Calculations:

Project activity mainly reduces CO_2 through substitution of coal based captive electricity generation

The emission reduction ERy by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation with fossil fuels (BEy) and project emissions (PEy), as follows:

ER y = BE y – PE y

Where,

ER y = are the emission reductions of the project activity during the year y in tons of CO_2

BE y = are the baseline emissions due to displacement of electricity during the year y in tons of CO_2.

PE y = are the project emission during the year y in tons of CO_2.

Baseline Emissions

BE y in tCO2 = $EF_{captive, y}$ X EG y

EG y = $EG_{GEN\ WHRB} - EG_{AUX\ WHRB}$ = Net Electricity supplied by project activity

= 85507 MWh - 8914 MWh
= 76593 or **say 76593 MWh**

EF y = Emission factor for the power generation (tCO_2/MWh)
= 1.26 tCO_2/MWh

BE y = EG y X EF y
= 76593 MWh X 1.26 tCO_2/MWh
= 96507.18 tCO2 **Or Say 96507 tCO2**

Project Emission (PEy)

PE y = No Project Emission is considered and no leakage is considered,
= 0 tCO_2/annum

Net Emission Reduction (ER y)

ER y = BEy - PEy
= 96507 tCO_2 - 0 tCO_2

= **96507 tCO_2/annum**

No project emission and no leakage is considered in line with methodology

Year	Estimation of	Estimation of	Estimate of	Estimation of

	Project activity emission (tonnes of CO2e)	baseline emission (tonnes of CO2e)	leakage (tonnes of CO2e)	overall emission reduction (tonnes of CO2e)
25/03/2009 to 31/03/2010	0	96507	0	96507

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

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	94303.00	96507[2]

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

>>

In the PDD annual estimated emission reductions are based on one calendar year. Whereas in this monitoring period the time period is extended by 8 more working days, which is just about 2.29% more time than a year accordingly there could have been an increase of 2.29% CERs for the extended time period but actual increase is only about 1.03%. Thus the effective emission reduction actual taken place is in accordance to the estimates of PDD. Hence this clause is actually not applicable, as there is no increase in actual emission reduction during the year. In this monitoring report 8 days extra are included against 1 year emission reduction calculation in registered PDD.

- - - - -

History of the document

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

[2] The estimate emission reduction in PDD is calculated for 1 year, whereas the emission reduction claimed is for 1 year and 8 days.