

MONITORING REPORT

28th May 2010

Version: 01

Verification # 02

RREPL-14 MW Rice
Husk Power Project

CDM Reference No: 0598

Monitoring Period: 1st April 2008 to 31st March 2010
(both days included)

Emission Reduction Claimed: 115842 tonnes CO₂e

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A. General description of the project activity

A.1. Brief description of the project activity

The purpose of the project activity is to generate electricity using Biomass like rice husk for generation of power to achieve better energy efficiency, produce eco-friendly power; achieve sustainable development of the industry by reducing CO2 emission and other GHG emissions due to degeneration and uncontrolled atmospheric burning of biomass. RREPL generates electricity and supply to or through CSEB grid which meets the demand of its consumers for electricity by producing and importing electricity from power stations generating electricity based on fossil fuel.

The 14 MW Rice Husk Power Project at R.R. Energy Private Limited, Raigarh, Chhattisgarh, India. The project activity is commissioned on 13th January 2007. The first monitoring period was from 1st February 2007 to 31st March 2008. The second monitoring period is from 1st April 2008 to 31st March 2010.

Emission Reduction Claimed: 115842 tonnes CO₂e

- Project Type: Small Scale
- Sectoral scope: 01
- Approved methodology: Type-I RENEWABLE ENERGY PROJECTS
- Category :. Grid connected renewable electricity generation I.D./ Version 08
- Host Party: Govt. of India.

The project has been completed with major equipment supplied as given in Table 1

Table 1: List of Equipment

Sl. No.	Equipment Description	Supplier Name & Address
1.	Steam Turbo Generators	Greenesol Power System Pvt. Ltd. No. 11/23, "SURYADEV" 20 th Main Road, 1-R Block Rajajinagar, West of Chord Road, Bangalore – 560 010 India
2.	Boilers	Thermax Babcock & Wilcox Limited D-1 MIDC, R. D. AGA Road Chinchwad PUNE – 411 019
7.	Cooling Towers	COMPOSITE AQUA SYSTEMS & EQUIPMENTS P. L. 39, Shahpurjat, Opp. Asian Village Complex New Delhi 110 049
15.	Distribution Transformers	EMCO LIMITED N-104, MIDC Area, Vill – Mehrun, Jalgaon
16.	Power Control Centre & Motor Control Centre	Breaker from AREVA T&D INDIA Limited Naini Allahabad – 211 008 and other control system purchased from various suppliers assembled at Master Panel

A.2. Project participants

Project Participant: RR ENERGY PRIVATE LIMITED - Private Entity

A.3. Location of the project activity

Garh Umaria , Darramuda ; Raigarh District, Chhattisagarh state
Longitude 85 degree 24.5 minutes East; Latitude 21 degree 51.2 minutes North.

A.4. Technical description of the project

The biomass is mainly rice husk. The electricity generating system comprises of :

- Stoker fired furnace
- Fluidised bed type boiler
- Steam drum
- Super heater
- 14 MW STG electromagnetic induction type
- Air cooled condensers
- De-mineralised water plant
- Fuel handling system
- Ash handling system
- 10 Air dryer etc.
- Air preheater and Economizer.

The biomass is burnt in fluidised bed boiler where sand is used as inert bed to produce 62T/hr of steam at 66 kg/ cm² pressure and 490±50C temperature. A small percentage of fossil fuel like coal is being used to ensure consistent generation of electricity. The outlet box of the FBB leads to ESP to remove SPM from exhaust gases. The exhaust gas temperature is kept at 160⁰C or lower. The steam from boiler at 66 kg/cm² pressure and 490C temperature is taken to high efficiency extraction cum condensing multi stage Steam Turbine and Generator (STG) and operated to generate 14 MW Electricity. Ash collected from hoppers & ESP is conveyed to Ash Silo.

Other system used is circulating water, Demineralised water plant, Instrument Air Compressor; air dryer. Steam from FBB passes through steam turbine rotor and exhausted in water cooled condenser and water is cooled in air cooled heat exchanger. Total Waste water is recycled and reused after treatment. The entire 14MW power after using a part of 14 MW for in-house consumption for equipment will be sold to or through CSEB grid who will further distribute to their consumers.

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

Title : RREPL-14MW Rice Husk Power Project

Baseline methodology used and its version: Type-I RENEWABLE ENERGY PROJECTS

Category I.D. Grid connected renewable electricity generation I.D./ Version 08, March 2006

Registered PDD and its version: RREPL-14MW Rice Husk Power Project (0598),

CDM document version no: 04, date: 07/09/2006

A.6. Registration date of the project activity

Date when project was registered: 28th Oct 2006

A.7. Crediting period of the project activity and related information

Starting date of the project activity : 1/11/2004

Start date :

From the date of CDM registration of project activity. / 01 September 2006 (expected date of commercial production) ; Project registration date : 28th Oct 2006

Crediting Period : 10 years

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

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B. Implementation of the project activity

B.1. Implementation status of the project activity

The project has started commercial production from 13th January 2007. The crediting period has been claimed from 1st February 2007.

The total shutdown period of the plant was 1095 hrs, 1316 hrs and 132:16 hrs during 2008, 2009 and 2010 respectively.

B.2. Revision of the monitoring plan

Revised Monitoring Plan approved on 08th Nov 2008

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

Not applicable

B.4. Notification or request of approval of changes

Not applicable

C. Description of the monitoring system

C.1. Data and parameters used to calculate baseline emissions

The power generated within the project boundary by TG is recorded through independent energy meter installed by the project proponent on the TG set and power exported to the Grid is recorded by electrical energy meter installed at the Sub-station of CSEB, which is sealed by the Government agency i.e. CSEB. Project proponent submits the monthly power export bill based on the joint meter reading recorded at CSEB sub-station based on the data recorded by CSEB personnel. Export meter is at the substation of CSEB. In the similar fashion the auxiliary meter installed at transformer for supplying auxiliary power to the Power plant is metered and recorded by the project proponent. These data are used for computation of net power generation by the project activity. The auxiliary power consumed by the project activity is recorded and deducted from Gross Power generation. This way the Net power generated by the project activity is arrived by deducting the auxiliary power consumed by the project activity from the gross power generated by the project activity. However the net power exported to the Grid which is recorded at “CSEB sub station” which already excludes the auxiliary power consumed within the plant as well as transmission losses incurred during wheeling of the power from project site to the substation, but does not exclude the power imported from the Grid. Therefore the net exported power to the grid is more conservative than the net power generation calculated by deducting the auxiliary power consumption from gross power generation, therefore as a conservative approach the net exported power to the Grid is considered after deducting the power imported from the Grid, for CER calculations.

Total fossil fuel consumption in the plant is recorded separately. The project emission from fossil fuel consumption is calculated based on the total calorific value energy provided. The project emission is deducted for arriving at the net emission reduction due to the Project Activity.

EX-ANTE CALCULATION OF BASELINE EMISSION FACTOR

$EF_{\text{electricity, y}}$ is the weighted average emission factor in current generation mix for the electricity displaced due to the project activity during the year y in tons CO₂ / MWh. (refer to page No. 57 of registered PDD)

$$= 0.9664 \text{ t CO}_2/\text{MWh}$$

BASELINE EMISSION:

$$ER_{\text{electricity, } y} = EG_y \times EF_y$$

Where:

$ER_{\text{electricity, } y}$ are the emission reductions due to displacement of electricity during the year y tons of CO_2 .

EF_y : is the weighted average emission factor in current generation mix for the electricity displacement due to the project activity during the year y in tons CO_2 / MWh. = 0.9664 t CO_2 / MWh

EG_y : is the net electricity supplied to or through CSEB grid

C.2. Data and parameters used to calculate project emissions

PEFF_y (PROJECT EMISSION)

$$PEFF_y = Q_i \times NCV \text{ (of coal)} \times EF_{CO_2} \times OXID_i$$

Where Q_i = Quantity of Coal consumed during the period. (in Tonnes)

NCV = NCV of Coal consumed during the period (in TJ/t)

EF_{CO_2} = Emission Factor for Coal in terms of CO_2 (in Tonnes) per TJ as per IPCC default value = 96.07 t/TJ

$OXID_i$ = Oxidation factor of Coal as per IPCC default value = 0.98

C.3. Data and parameters used to calculate leakage emissions

Leakage : Nil

C.4. Other relevant data and parameters

- biomass and fossil fuel consumed for the project activity (tonnes)
- Net calorific value of rice husk and coal

EMISSION REDUCTIONS:

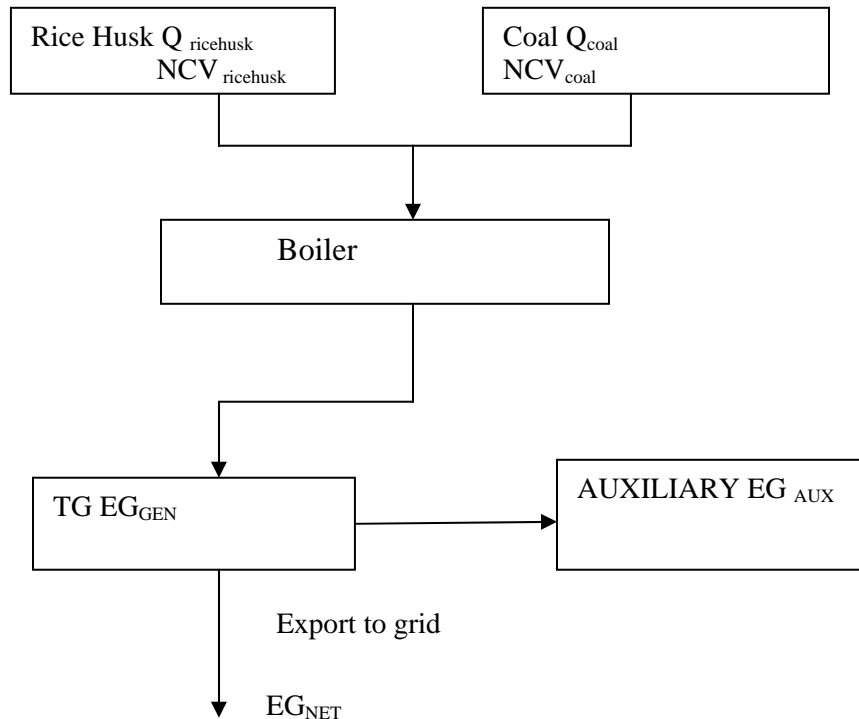
$$ER_y = ER_{\text{electricity, } y} - PEFF_y$$

Where:

ER_y : are the emissions reductions of the project activity during the year y in tons of CO_2 .

$PEFF_y$: Emission arising out of combustion of fossil fuel (Coal) due to co-firing.

D. Data and Parameters monitored



A CDM team has been working in RREPL for monitoring and verification of all the monitoring parameters as per the guidelines formulated by management of RREPL .Qualified and trained people monitor the parameters and emission reduction calculations .In the complete implementation and monitoring plan, RREPL is the sole agency responsible for implementation and monitoring.

For Electrical Parameters:

- Gross Generation and Auxiliary Consumption is metered continuously and recorded by Shift Operator from meters provided at TG on daily basis, this records is submitted to Manager (Elec.), Manager (QA and QC), and CDM officer, which is verified on daily basis.
- Export & Import of Power is metered continuously and reading is taken by CSEB personnel's on monthly basis.

For Fuel Parameters:

- Biomass and Fossil Fuel received at the plant is weighed at the inward section of the **plant, and daily receipt** is compiled by the stores in-charge.

- Biomass and Fossil Fuel issued and consumed at the plant is weighed, and daily consumption is compiled by the stores in-charge.
- NCV of Biomass and Coal (Fossil Fuel) is analyzed by the lab in-charge on monthly basis and on change of source of fuel.

QA/QC Procedures:

Log book signed by the shift In charge daily. Meters are calibrated annually. As the main meters of Generation and Auxiliary Consumption are sealed by CSEB, the meters are regularly under QA/QC procedure for any variation. If variation is noticed, calibration will be done immediately. Manager (QA & QC) would be responsible for the calibration of the meters. Weighbridge undergoes maintenance as per defined industry standards. This data can be cross checked against purchase receipts and inventory data. Belt weigher will be calibrated once in a year and logbook will be maintained at site. Any uncertainty like inconsistency/discrepancy of data parameters will be dealt with various corrective actions. These will be reported along with its time of occurrence, possible reasons and duration. Uncertainty with metering (if any difference between recording of Main meter and Check meter) will be dealt jointly both by project proponent and CSEB representative. Corrective actions will be undertaken after identification of reason for such uncertainty.

Table 2 : Monitoring Plan, Generation and Emission Reduction

ID No.	Data Type	Data Variable	Data unit	Measured, (m) calculated (c) estimated (c)	Recording Frequency	Proportion of data to be monitored	How the data will be achieved electronic / data	For how long is achieved to be kept (Year)	Comment
1. E _{GEN}	Quantitative	Total electricity generated Location i) At generating plant	MWH /month h	Online measurement (m)	Continuously/month	100%	Electronic /Paper	12	Monitoring location Power Generation meter at plant and DCS will measure the data.
2. E _{AUX}	Quantitative	Auxiliary electricity Consumption Location i) At Consumption point	MWH /month h	Online measurement (m)	Continuously/month	100%	Electronic/ Paper	12	Monitoring location: Auxiliary Consumption meter at plant and DCS will measure the data. .
3. E _{NET}	Quantitative	Net electricity generated from small-scale project activity	MWH /month h	Calculated	Continuously/month	100%	Electronic /Paper	12	Calculated from the above measured parameters. Algorithm for project emission calculation given in baseline methodology. $E_{NET} = E_{GEN} - E_{AUX}$.
4. E _{NET}	Quantitative	Net electricity generated from small-scale project activity	MWH /month h	Online measurement (m)	Continuously/month	100%	Electronic /Paper	12	The CSEB export meter at the export terminal . The CSEB will be regularly checking the calibration of the meter.

ID No.	Data Type	Data Variable	Data unit	Measured, (m) calculated (c) estimated (c)	For which baseline method (s) must	Recording Frequency	Proportion of data to be monitored	How the data will be achieved electronic / data	For how long is achieved to be	Comment
5. EF _y	Emission factor	CO2 emission factor of the grid	tCO2eq/MWH	Calculated (c)	Ex-ante Weighted average of generation mix	Once during validation (Ex-ante)	100%	Electronic /Paper	12	Calculated once during validation (Ex-ante)
6. EF _{OM,y} simple	Emission factor	CO2 operating margin emission factor of the grid	tCO2eq/MWH	Calculated (c)	Simple OM	Once during validation (Ex-ante)	100%	Electronic/ Paper	12	Calculated once during validation (Ex-ante).
7. Fi,j,y	Fuel Qty	Amount of each fossil fuel consumed by grid and by importing plant/sources	Tonnes	Estimated/Calculated	Simple OM, BM	Once during validation (Ex-ante)	100%	Electronic /Paper	12	Obtained from Western Region Grid report CEA documents. Once during validation ex-ante
8. COEF _{i,k}	Emission factor coefficient	CO2 emission coefficient for each by grid and by importing plants/sources	tCO2eq/t of fuel	Calculated based on CEA data/Estimated based on IPCC values	Simple OM, BM	Once during validation (Ex-ante)	100%	Electronic /Paper	12	Obtained from Western Region Grid report CEA documents. Once during validation ex-ante
9. GEN _{j,y}	Electrical Qty	Electricity generation/import of CSEB grid	MWH/yr	Estimated	Simple OM	Once during validation (Ex-ante)	100%	Electronic /Paper	12	Obtained from Western Region Grid report CEA documents. Once during validation ex-ante

ID No.	Data Type	Data Variable	Data unit	Measured, (m) calculated (c) estimated (e)	For which baseline method(s) must this element be included	Recording Frequency	Proportion of data to be monitored	How the data will be archived electronic / paper	For how long is archived to be kept (Years)	Comment
10. Qi	Consumption of fuel quantity for project activity (1) Biomass (2) fossil fuel i.e. Coal	Weight	Tonnes/day	Measured	For calculating project emission	daily	100%	Electronic / Paper	12	It will be measured and can be verified by Stock Register/incoming receipts.
11. NCV	Fuel quality (1) Biomass (2) fossil fuel i.e. Coal	Calorific value	K Cal/kg	Calculated	For calculating project emission	monthly	100%	Electronic / Paper	12	By govt. recognised or external laboratory.

Table 3: Calibration Details

Sr. No.	NAME OF EQUIPMENT		MAKE	SERIL NO.		LAST CALIBRATION	DUE CALIBRATION	Accuracy class
1	Generation Meter		SEMS	WBB04253		6/3/2010	03/05/2011	0.5
2	Export Meter (Kotara Road)		SEMS	CSE29182		24/11/2009	23/11/2010	0.5
3	Main Export Meter		SEMS	APM0541		25/11/2009	24/11/2010	0.5
4	Check Export Meter		SEMS	APM0540		25/11/2009	24/11/2010	0.5
5	Aux Meter		CONZERV	EM6400, 185279/3569-3809		11/9/2009	09/10/2010	1.0
6	Belt Weigher		ACME	AWBS100		14/11/2009	13/11/2010	0.05%+/-

7	Bomb Calorimeter					12/05/2008		
8	Generation Meter		SEMS	CSE37723		7/3/2009	03/06/2010	0.5
9	Aux Meter		CONZERV	EM6400,112491/3534-0107		22/4/2009	22/4/2010	1.0
Aux Meter								
	Aux Meter		CONZERV	EM6400,112491/3534-0107		01/04/2007	01/03/2008	1.0
	Aux Meter		CONZERV	EM6400,112491/3534-0107		23/04/2008	22/04/2009	1.0
	Aux Meter		CONZERV	EM6400,112491/3534-0108		23/04/2009	22/04/2010	1.0
	Aux Meter		CONZERV	EM6400, 185279/3569-3809		11/9/2009	09/10/2010	0.5 s
	On Line Calibrated,							
Generation Meter								
	Generation Meter		HPL BSOCOME C	31648084		01/07/2007	01/06/2008	1.0
	Generation Meter		HPL BSOCOME C	31648084		19/12/2007	18/12/2008	1.0
	Meter changed at - 18/10/2008 New Meter - Make SEMS, Serial No. - WBB04253							
	Generation Meter		SEMS	WBB04253		04/10/2008	04/09/2009	0.5
	Meter changed at - 6/04/2009 NEW METER - MAKE SEMS, SERIL NO. - CSE37723							
	Generation Meter		SEMS	CSE37723		03/07/2009	03/06/2010	0.5
	Meter changed at - 09/03/2010 New Meter - Make SEMS, Seril No. - Wbb04253							
Export Meter								
	For 33 KV Line Export Meter							
	Export Meter (Chhatamuda Sub Station)		SEMS	CSE18233		25/11/2006	23/11/2007	0.5
	Export Meter (Chhatamuda Sub Station)		SEMS	CSE18233		23/11/2007	22/11/2008	0.5
	This Meter removed to Kotara Road At 1/10/2008, and new meter fitted in our end At 20/10/2008. New Meter - Make - SEMS							
	Seril No. - Apm05041							
	Main Export Meter		SEMS	APM0541(ABT METER)		30/08/2008	29/08/2009	0.2s
	Main Export Meter		SEMS	APM0541(ABT METER)		25/11/2009	24/11/2010	0.2s

	New meter fitted in Kotara Road for export. At 07/04/2009. New Meter - Make Sems, Seril No. - Cse29182										
	Export Meter (Kotara Road)				SEMS	CSE29182			26/03/2009	25/03/2010	0.2s
	Export Meter (Kotara Road)				SEMS	CSE29182			24/11/2009	23/11/2010	0.2s
	Belt Weigher				ACME	AWBS100			09/04/2007	09/03/2008	0.05%+/-
	Belt Weigher				ACME	AWBS100			28/5/2008	27/05/2009	0.05%+/-
	Belt Weigher				ACME	AWBS100			12/12/2008	11/012/2009	0.05%+/-
	Bomb Calorimeter							02/08/2007			
								04/05/2008			
								06/07/2008			
								08/05/2008			
								10/09/2008			
								06/04/2009			
								09/08/2009			

E. Emission Reduction Sheet

	Egen (in MWh)	Eaux (in MWh)	Enet as per plant (Egen-Eaux) IN MWh	Enet as per export Meter of CECB (MWh)	Power Import From CSEB (MWH)	E1Net Net Power Export (E _{Export} - E _{Import}) in MWH	Rice Husk in Tonnes	Average NCV RH in Tjx10 ³ /t	Total ENERGY of RH in TJ	Coal in Tonne	Average NCV coal in Tjx10 ³ /t	Total ENERGY of coal in TJ	PEFFy= Emission arised out of combustion of Coal	Emission Factor (EFy)	Gross Emission Reduction (ER electricity, y) in t CO2e	Net Emission Reduction (ERy) in t CO2e
Apr-08	10021.34	791.56	9229.78	9058.20	21.75	9036.45	11556	13.92	160860	84	16.24	1364	128.4	0.9664	8733	8604
May-08	10471.23	917.09	9554.14	9374.25	3.90	9370.35	12365	13.90	171874	0	0.00	0	0.0	0.9664	9056	9056
Jun-08	9963.27	856.81	9106.46	8951.55	21.00	8930.55	10004	13.96	139616	1732	15.91	27554	2594.2	0.9664	8630	6036
Jul-08	10318.72	858.33	9460.39	9294.45	15.30	9279.15	6764	14.04	94967	4896	15.91	77895	7333.7	0.9664	8967	1634
Aug-08	9955.32	843.64	9111.68	8953.65	15.75	8937.90	9177	14.20	130268	2464	13.95	34383	3237.1	0.9664	8638	5401
Sep-08	8797.99	785.24	8012.75	7902.60	43.05	7859.55	10289	14.34	147544	248	14.00	3472	326.9	0.9664	7595	7269
Oct-08	1743.36	227.00	1516.36	1562.00	100.91	1461.10	2247	14.60	32806	0	0.00	0	0.0	0.9664	1412	1412
Nov-08	9374.40	719.89	8654.51	8526.50	20.50	8506.00	11999	14.54	174465	0	0.00	0	0.0	0.9664	8220	8220
Dec-08	11228.40	809.29	10419.11	10292.00	48.00	10244.00	12090	13.92	168293	0	14.19	0	0.0	0.9664	9900	9900
Jan-09	10989.26	780.88	10208.38	10095.50	2.50	10093.00	11131	0.00	0	2327	14.36	33411	3978.3	0.9664	9754	5776
Feb-09	10496.52	813.52	9683.00	9588.00	9.50	9578.50	8394	13.66	114696	2943	13.68	40248	6130.2	0.9664	9257	3127
Mar-09	10392.12	836.02	9556.10	9452.50	1.50	9451.00	8073	14.02	113167	4761	13.43	63959	5591.6	0.9664	9133	3542
Apr-09	10302.40	855.13	9447.27	9393.05	6.00	9387.05	8049	14.19	114248	4421	13.48	59608	5577.8	0.9664	9072	3494
May-09	10374.00	873.03	9500.97	9480.24	14.00	9466.24	8283	14.11	116873	4176	13.27	55424	0.0	0.9664	9148	9148
Jun-09	8127.00	705.62	7421.38	7424.88	46.00	7378.88	6675	14.15	94418	3087	13.30	41066	3866.3	0.9664	7131	3265
Jul-09	4998.00	430.28	4567.72	4600.56	48.00	4552.56	3915	14.13	55303	2095	13.25	27763	2613.8	0.9664	4400	1786
Aug-09	9198.00	738.32	8459.68	8442.48	10.50	8431.98	6296	14.13	88962	4542	13.28	60322	5679.3	0.9664	8149	2469
Sep-09	5629.00	495.1	5133.90	5166.72	66.50	5100.22	4232	14.13	59798	2366	12.18	28825	2713.8	0.9664	4929	2215
Oct-09	9959.00	786.01	9172.99	9169.96	21.00	9148.96	7712	14.11	108839	4018	11.55	46420	4370.4	0.9664	8842	4471
Nov-09	11117.00	851.85	10265.15	10240.84	0.00	10240.84	9330	13.23	123436	3863	14.18	54777	5157.2	0.9664	9897	4740
Dec-09	9480.00	701.81	8778.19	8732.16	0.00	8732.16	6963	12.75	88778	4420	12.75	56355	5305.7	0.9664	8439	3133
Jan-10	8392.00	624.12	7767.88	7784.88	42.00	7742.88	5889	10.71	63071	4240	14.12	59865	5636.2	0.9664	7483	1847
Feb-10	9753.00	704.34	9076.33	9026.16	0.50	9025.66	8011	13.66	109462	3666	13.68	50136	4720.3	0.9664	8722	4002
Mar-10	11376.92	908.4	10468.52	10417.92	3.00	10414.92	9841	14.02	137951	3769	13.43	50633	4767.0	0.9664	10065	5298
Total	222458.2	17913.3	204572.63	202931.05	561.16	202369.90	199285		2609695	64118		873482	79728.25		195570	115842

Total Emission Reduction: 115842 t CO2 e

E.1. Baseline emissions calculation

$$ER_{\text{electricity, y}} = EG_y \times EF_y$$

Where:

$ER_{\text{electricity}}$, are the emission reductions due to displacement of electricity during the year y tons of CO₂.
 EF_y : is the weighted average emission factor in current generation mix for the electricity displacement due to the project activity during the year y in tons CO₂ / MWh. = 0.9664 t CO₂/ MWh
 EG_y : is the net electricity supplied to or through CSEB grid

E.2. Project emissions calculation

PEFF_y (PROJECT EMISSION)

$$PEFF_y = Q_i \times NCV \text{ (of coal)} \times EF_{CO_2} \times OXID_i$$

Where Q_i = Quantity of Coal consumed during the period. (in Tonnes)

NCV = NCV of Coal consumed during the period (in TJ/t)

EF_{CO_2} = Emission Factor for Coal in terms of CO₂ (in Tonnes) per TJ as per IPCC default value = 96.07 t/TJ

$OXID_i$ = Oxidation factor of Coal as per IPCC default value = 0.98

E.3. Leakage calculation

Nil

E.4. Emission reductions calculation

$$ER_y = ER_{\text{electricity, y}} - PEFF_y$$

Where:

ER_y : are the emissions reductions of the project activity during the year y in tons of CO₂.

$PEFF_y$: Emission arising out of combustion of fossil fuel (Coal) due to co-firing.

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

Emission as per registered PDD : 110944 t CO₂e

Actual emissions 115842 t CO₂e

E.6. Remarks on difference from estimated value

Emission as per registered PDD : 110944 t CO₂e

Difference from estimated value: 4% increase in CERs due to reduced shutdown.