

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

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version number 01 Date 28/10/2010

Biomass Based Independent Power Project at Malwa Power Private Limited, Mukatsar, Punjab
Project Reference Number: 0331
Monitoring Period: 6 (01/09/2009 - 31/08/2010)

SECTION A. General description of the project activity

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

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Malwa Power Private Limited (MPPL) was incorporated in January 2002 as a Special Purpose Vehicle for setting up biomass based power plants. MPPL has set up the biomass based power plant at district Mukatsar in state of Punjab (project activity). The project activity generates electricity and exports it to the regional grid. The major equipment of the project activity comprise a 7.5 MW bleed cum condensing type turbine and one 31.5 tons per hour (TPH) and 67 atmosphere (atm) pressure boiler.

The purpose of the project activity is to utilize surplus biomass available in the region for effective generation of electricity for supply to grid to meet the ever-increasing demand for energy in the region. The project activity reduces the Green House Gas (GHG) emissions produced by the regional grid generation mix, which is mainly dominated by fossil fuel based power plants.

The technology employed in the project activity consists of a boiler to combust biomass and generate steam that drives a turbine. The turbine is connected to a generator that converts the mechanical energy into electricity energy. Since, the GHG emissions due to the combustion of biomass are neutralized by the sequestration that took place during the growth cycle of the biomass crop, the CO₂ emissions during combustion of biomass can be ignored. Therefore, electricity is generated through sustainable means without causing any negative effect on the environment and hence the technology is environmentally safe and sound.

The project activity was synchronized with the grid on 27 April 2005 and was declared commercially operative on the same day.

The total emission reductions achieved in this monitoring period are 46,557 tCO₂.

A.2. Project Participants

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants(as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Malwa Power Private Limited (Private Entity)	No
Germany	Vattenfall Europe Generation AG (Private Entity)	No
United Kingdom of Great Britain and Northern Ireland	EDF Trading Ltd. (Private Entity)	No

A.3. Location of the project activity:

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The project activity has been implemented at the following location:

Village: Gulabewalla
Tehsil: Mukatsar

District: Mukatsar
State: Punjab
Country: India

GPS Coordinates:

Latitude: 30.5605°
Longitude: 74.4775°

A.4. Technical description of the project

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The power plant has a boiler sized to produce a maximum of 31.5 TPH of steam and 7.5 MW steam turbine, which is a bleed cum condensing type machine. The steam conditions at the boiler heat outlet are a pressure of 67 atm and temperature of 465 °C. Fluidized Bed Combustion type boiler has been selected, primarily due to its flexibility in fuel firing and as per the norms prescribed by Punjab Pollution Control Board. All the necessary auxiliary facilities of the power plant including Reverse Osmosis water treatment plant, cooling tower, condensate system, fuel storage and handling systems, electrical power evacuation system, ash handling system, fire fighting system, compressed air system, instrumentation and control system etc. have been provided for the power plant. The plant and equipment facilities have been designed to comply with the applicable stipulations / guidelines of statutory authorities such as State Pollution Control Board etc. Power is generated at 11 kV at the plant and is evacuated to grid at 66 kV through a capacity transformer.

Combustion technology has been selected for the power plant, wherein biomass is burnt as fuel in a steam generator to produce high pressure steam, which is then expanded in turbo-generators to generate power. Therefore, electricity is generated through sustainable means without causing any negative effect on the environment and hence the technology is environmentally safe and sound.

The major equipments installed in the project activity are as follows:

S. No.	Equipment	Supplier
1.	<u>Boiler</u> Type: Fluidized Bed Combustion Capacity: 31.5 TPH, 67 atm & 465 °C Serial No.: BDF-315	Thermax Limited, Pune
2.	<u>T.G. Set</u> Type: Bleed cum condensing Capacity: 7.5 MW steam turbine Serial No.: 16	M/s Triveni Engineering & Industries Ltd 12A, Peenya Industrial Area Bangalore, India

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

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Title: AMS.I.D 'Grid connected renewable electricity generation' Version 07

Main Category: Type I - Renewable Energy Projects

Sub Category: I.D- Grid connected renewable electricity generation

The reference has been taken from the indicative simplified baseline and monitoring methodologies for small-scale CDM project activity categories -Version 7

A.6. Registration date of the project activity:

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30th April 2006

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

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Crediting period: 01 May 05 - 30 Apr 15

Choice of crediting period: Fixed

A.8. Name of responsible person(s)/entity(ies):
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Entity responsible for completing the monitoring report form (CDM-MR):

Malwa Power Private Limited

Mr. Krishan Lalit Bansal

Director

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The project activity was synchronized with the grid on 27 April 2005 and was declared commercially operative on the same day. The project activity has been in operation continuously (with outages – forced & planned) ever since. The outages in the current monitoring period are as follows:

Month	From		To		Duration HH:MM	Reason
	Date	Time	Date	Time		
Sep 2009	01-Sep-09	6:00 AM	21-Sep-09	12:42 AM	474:42	Scheduled Maintenance Shutdown for Turbine & Boiler
	26-Sep-09	10:56 PM	27-Sep-09	12:11 AM	01:15	TG Tripping
Oct 2009	06-Oct-09	10:31 AM	06-Oct-09	2:22 PM	03:51	ID Fan work
	20-Oct-09	4:09 AM	21-Oct-09	1:52 PM	33:43	For Boiler Cleaning
Nov 2009	04-Nov-09	6:33 AM	04-Nov-09	8:09 PM	13:36	For Boiler Cleaning
	07-Nov-09	7:47 PM	08-Nov-09	1:22 PM	17:35	For Boiler Cleaning
Dec 2009	02-Dec-09	11:58 PM	03-Dec-09	7:30 PM	19:32	For Boiler Cleaning
	25-Dec-09	11:20 AM	26-Dec-09	1:22 AM	14:02	For Boiler Cleaning
Jan 2010	07-Jan-10	10:15 AM	07-Jan-10	12:51 PM	02:36	Boiler MCC Tripped
	22-Jan-10	9:38 AM	22-Jan-10	11:49 AM	02:11	TG Tripping
	23-Jan-10	2:22 PM	23-Jan-10	10:25 PM	08:03	For Boiler Cleaning
	24-Jan-10	12:06 PM	24-Jan-10	1:30 PM	01:24	TG Tripping
	25-Jan-10	1:08 PM	26-Jan-10	8:06 PM	30:58	For Boiler Cleaning
Feb 2010	02-Feb-10	4:10 PM	02-Feb-10	4:30 PM	00:20	TG Tripping
	04-Feb-10	6:39 AM	05-Feb-10	12:47 AM	18:08	For Boiler Cleaning
	26-Feb-10	6:11 AM	27-Feb-10	3:16 PM	33:05	For Boiler Cleaning
Mar 2010	07-Mar-10	5:15 PM	08-Mar-10	7:38 AM	14:23	For Boiler Cleaning
	16-Mar-10	10:05 PM	18-Mar-10	12:03 AM	25:58	For Boiler Cleaning
	27-Mar-10	12:17 AM	27-Mar-10	8:46 PM	20:29	For Boiler Cleaning
Apr 2010	17-Apr-10	4:40 PM	18-Apr-10	2:09 PM	21:29	For Boiler Cleaning
	21-Apr-10	2:12 PM	22-Apr-10	2:08 PM	23:56	For Boiler Cleaning
May 2010	01-May-10	4:07 PM	01-May-10	4:17 PM	00:10	Due to FD Fan
Jun 2010	03-Jun-10	6:00 AM	04-Jun-10	12:44 PM	30:44	Due to continue rain
	15-Jun-10	2:49 AM	15-Jun-10	7:00 PM	16:11	Due to continue rain
	16-Jun-10	1:48 PM	17-Jun-10	1:37 AM	11:49	Due to continue rain
	23-Jun-10	8:30 PM	24-Jun-10	1:06 PM	16:37	Due to continue rain
Jul 2010	07-Jul-10	10:35 AM	07-Jul-10	11:50 AM	01:15	TG Tripping
	09-Jul-10	4:31 AM	13-Jul-10	5:43 PM	109:12	Due to continue rain
	13-Jul-10	7:50 PM	14-Jul-10	12:20 PM	16:30	For Boiler Cleaning
	24-Jul-10	3:23 AM	26-Jul-10	7:49 PM	64:26	Due to continue rain
Aug 2010	06-Aug-10	5:11 PM	06-Aug-10	6:12 PM	01:01	TG Tripping
	10-Aug-10	6:07 PM	14-Aug-10	5:33 PM	95:26	Due to continue rain
	15-Aug-10	11:01 PM	16-Aug-10	1:59 AM	02:58	TG Tripping
	16-Aug-10	6:08 PM	21-Aug-10	2:13 PM	116:05	Due to continue rain
	30-Aug-10	1:41 AM	01-Sep-10	6:00 AM	52:19	Due to continue rain

No events or situations have occurred during the monitoring period which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

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There has been no revision in the monitoring plan for the project activity.

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

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There has been no deviation applied to this monitoring period of the project activity.

B.4. Notification or request of approval of changes
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There has been no notification submitted or request of approval of changes from registered PDD applied to the project activity.

SECTION C. Description of the monitoring system

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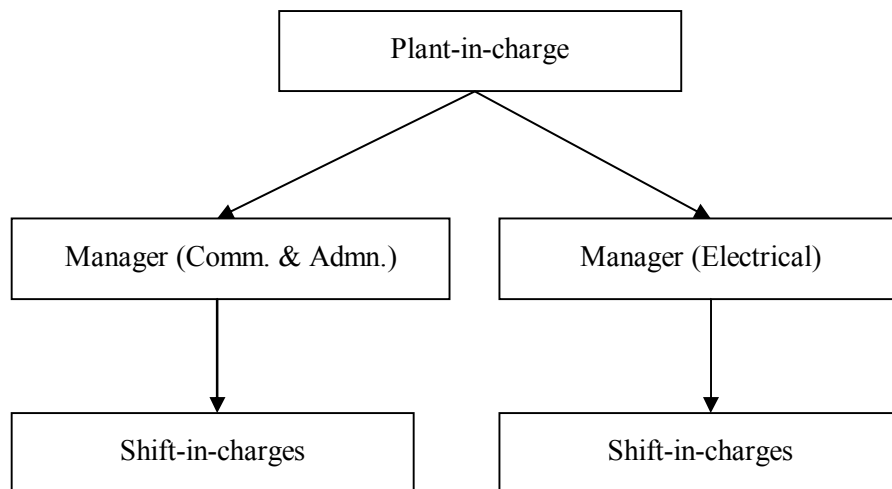
The energy exported to the PSEB is recorded from two independent set of meters - Main Meter & Check Meter. The readings from the Main Meter are used for billing purposes. In case the Main Meter goes out of operation, the reading of the backup meter (Check Meter) is used for billing. Till date only the main meter has been used for billing purposes.

The calibration and testing of monitoring equipment is being carried out regularly according to the requirements of PSEB. Power Generation, Export & Auxiliary Consumption and fuel consumption is being recorded and verified daily by the Shift-in-charge which is thereafter approved by the Plant in-charge. Since hourly data logging is being carried out along with daily reporting, the uncertainty level associated with the monitored data used for calculating emission reductions is low.

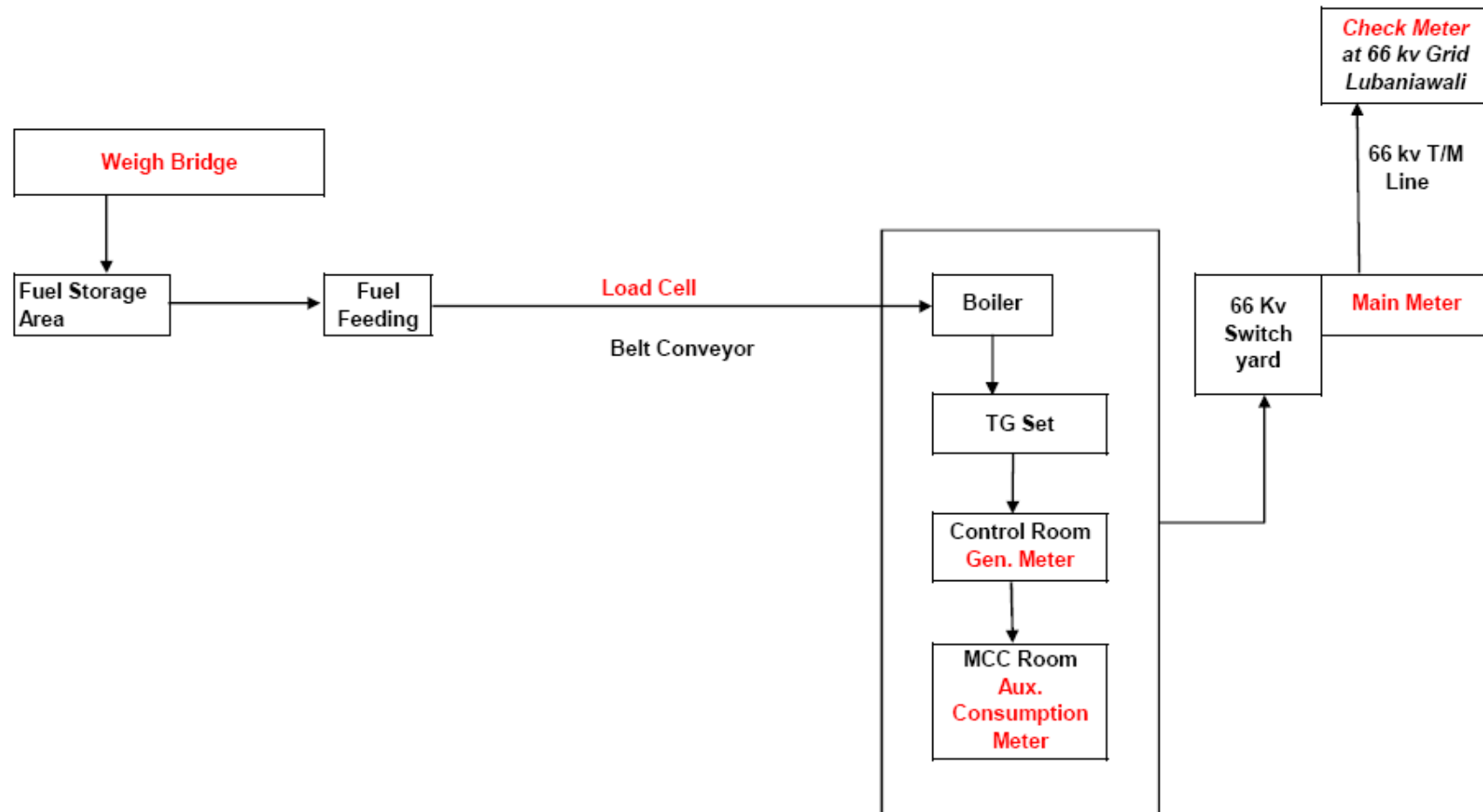
MPPL is the sole agency responsible for implementation of the monitoring plan. The Shift in-charge is responsible for the hourly data recording at generation end. Daily and monthly reports stating the generation, auxiliary consumption, and net power export are prepared by the Shift in-charge and verified by the Plant Manager. Records of the monthly joint meter reading are maintained by the Plant Manager at site as well as by PSEB at their office.

Furthermore Internal Audits are carried out in accordance with the GHG Performance Procedures of MPPL to ensure compliance with the monitoring methodology and plan.

Organizational Structure



**Single Line Diagram for Monitoring Points of 7.5 MW Power Plant of M/s Malwa Power (P) Ltd.
at Vill - Gulabewala, Distt - Muktsar (PB)**



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

Data / Parameter:	EF_v
Data unit:	tCO ₂ /MWh
Description:	CO ₂ baseline emission factor for the electricity displaced due to the project activity
Source of data used:	The baseline emission factor for the project activity has been calculated in the registered PDD using the power generation mix and recent capacity additions of Northern Regional electricity grid
Value(s) :	0.942
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Additional comment:	This parameter has been fixed ex-ante for the entire crediting period in the registered PDD.

D.2. Data and parameters monitored

Data / Parameter:	Energy exported
Data unit:	kWh
Description:	Electricity exported by the project activity to PSEB
Measured /Calculated /Default:	Measured
Source of data:	Monthly Joint Meter Readings taken at the interconnection point in the presence of officials of MPPL and PSEB
Value(s) of monitored parameter:	Monthly recorded values of exported energy have been presented in a tabular format in section E.1
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)	<p>Main Meter</p> <p>Type: Electronic Trivector Energy meter Accuracy Level: 0.5 Serial number: 04180597 Model No.: ER300P Meter Manufacturer: L&T Measurement principle: 4 quadrant bidirectional meter Measurement range: 0 – 99,999,999 Location: 66 kV Switch Yard near power plant Calibration frequency: Six months</p> <p>Date of calibration: 24.06.2009 Validity till: 24.12.2009 Calibration Agency: Punjab State Electricity Board</p> <p>Date of calibration: 24.12.2009 Validity till: 24.06.2010 Calibration Agency: Punjab State Electricity Board</p> <p>Date of calibration: 23.06.2010</p>

	<p>Validity till: 23.12.2010 Calibration Agency: Punjab State Electricity Board</p> <p><u>Check Meter</u> Type: Electronic Trivector Energy meter Accuracy Level: 0.5 Serial number: 04180598 Model No.: ER300P Meter Manufacturer: L&T Measurement principle: 4 quadrant bidirectional meter Measurement range: 0 – 99,999,999 Location: Lubaniawali Substation Calibration frequency: Six months</p> <p>Date of calibration: 24.06.2009 Validity till: 24.12.2009 Calibration Agency: Punjab State Electricity Board</p> <p>Date of calibration: 24.12.2009 Validity till: 24.06.2010 Calibration Agency: Punjab State Electricity Board</p> <p>Date of calibration: 23.06.2010 Validity till: 23.12.2010 Calibration Agency: Punjab State Electricity Board</p>
Measuring/ Reading/ Recording frequency:	Recording frequency: Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The main and check meters are test checked for accuracy every six months.

Data / Parameter:	Energy imported
Data unit:	kWh
Description:	Electricity imported by the project activity from PSEB
Measured /Calculated /Default:	Measured
Source of data:	Monthly Joint Meter Readings taken at the interconnection point in the presence of officials of MPPL and PSEB
Value(s) of monitored parameter:	Monthly recorded values of imported energy have been presented in a tabular format in section E.1
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)	<p><u>Main Meter</u> Type: Electronic Trivector Energy meter Accuracy Level: 0.5 Serial number: 04180597 Model No.: ER300P Meter Manufacturer: L&T Measurement principle: 4 quadrant bidirectional meter Measurement range: 0 – 99,999,999 Location: 66 kV Switch Yard near power plant Calibration frequency: Six months</p>

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Measuring/ Reading/ Recording frequency:	Recording frequency: Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The main and check meters are test checked for accuracy every six months.

Data / Parameter:	Net saleable energy
Data unit:	kWh
Description:	Net electricity exported by the project activity to PSEB
Measured /Calculated /Default:	Calculated
Source of data:	Monthly Joint Meter Readings taken at the interconnection point in the presence of officials of MPPL and PSEB
Value(s) of monitored parameter:	Monthly recorded values of net saleable energy have been presented in a tabular format in section E.1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial	Not applicable

number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Recording frequency: Monthly
Calculation method (if applicable):	Net saleable energy = Energy exported – Energy imported
QA/QC procedures applied:	The main and check meters are test checked for accuracy every six months.

Data / Parameter:	Energy generated																													
Data unit:	kWh																													
Description:	Gross energy generated from the project activity																													
Measured /Calculated /Default:	Measured																													
Source of data:	Log books																													
Value(s) of monitored parameter:	<table><tr><th>Month</th><th>Gross Electricity generated (kWh)</th></tr><tr><td>Sep-09</td><td>1,840,200</td></tr><tr><td>Oct-09</td><td>5,382,745</td></tr><tr><td>Nov-09</td><td>5,229,176</td></tr><tr><td>Dec-09</td><td>5,416,738</td></tr><tr><td>Jan-10</td><td>5,301,269</td></tr><tr><td>Feb-10</td><td>4,720,544</td></tr><tr><td>Mar-10</td><td>5,213,725</td></tr><tr><td>Apr-10</td><td>5,054,039</td></tr><tr><td>May-10</td><td>5,525,843</td></tr><tr><td>Jun-10</td><td>4,735,808</td></tr><tr><td>Jul-10</td><td>4,112,957</td></tr><tr><td>Aug-10</td><td>3,493,208</td></tr><tr><td>TOTAL</td><td>56,026,252</td></tr></table>		Month	Gross Electricity generated (kWh)	Sep-09	1,840,200	Oct-09	5,382,745	Nov-09	5,229,176	Dec-09	5,416,738	Jan-10	5,301,269	Feb-10	4,720,544	Mar-10	5,213,725	Apr-10	5,054,039	May-10	5,525,843	Jun-10	4,735,808	Jul-10	4,112,957	Aug-10	3,493,208	TOTAL	56,026,252
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Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used for any calculations. Demonstrates smooth operation of the power plant.																													
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Electronic Energy meter Accuracy Level: 0.5 Serial number: 4249596 Model No.: ER300P Meter Manufacturer: L&T Measurement principle: 3 phase 4 wire Electronic energy meter Measurement range: 0 – 99,999,999 Location: Power Plant Control Room Calibration frequency: Six months Date of calibration: 01.06.2009 Validity till: 01.12.2009 Calibration Agency: Internal Testing Date of calibration: 27.11.2009 Validity till: 27.05.2010 Calibration Agency: Internal Testing																													

	Date of calibration: 25.05.2010 Validity till: 25.11.2010 Calibration Agency: Internal Testing
Measuring/ Reading/ Recording frequency:	Recording frequency: Hourly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	The meter is checked every six months through internal testing.

Data / Parameter:	Auxiliary energy consumption																												
Data unit:	kWh																												
Description:	Auxiliary energy consumption of the project activity																												
Measured /Calculated /Default:	Measured																												
Source of data:	Log books																												
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th>Month</th><th>Auxiliary consumption (kWh)</th></tr> </thead> <tbody> <tr><td>Sep-09</td><td>215,000</td></tr> <tr><td>Oct-09</td><td>518,000</td></tr> <tr><td>Nov-09</td><td>500,000</td></tr> <tr><td>Dec-09</td><td>523,100</td></tr> <tr><td>Jan-10</td><td>527,400</td></tr> <tr><td>Feb-10</td><td>454,500</td></tr> <tr><td>Mar-10</td><td>498,000</td></tr> <tr><td>Apr-10</td><td>480,000</td></tr> <tr><td>May-10</td><td>536,000</td></tr> <tr><td>Jun-10</td><td>482,000</td></tr> <tr><td>Jul-10</td><td>422,000</td></tr> <tr><td>Aug-10</td><td>376,000</td></tr> <tr><td>TOTAL</td><td>5,532,000</td></tr> </tbody> </table>	Month	Auxiliary consumption (kWh)	Sep-09	215,000	Oct-09	518,000	Nov-09	500,000	Dec-09	523,100	Jan-10	527,400	Feb-10	454,500	Mar-10	498,000	Apr-10	480,000	May-10	536,000	Jun-10	482,000	Jul-10	422,000	Aug-10	376,000	TOTAL	5,532,000
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Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used for any calculations. Demonstrates smooth operation of the power plant.																												
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Electronic Energy meter Accuracy Level: 1.0 Serial number: 63116/3171-0405 Model No.: DM 5240 Meter Manufacturer: Enercon Measurement principle: 3 phase 4 wire Electronic energy meter Measurement range: 0 – 9,999 Location: Power Plant Control Room Calibration frequency: Six months Date of calibration: 01.06.2009 Validity till: 01.12.2009 Calibration Agency: Internal Testing Date of calibration: 27.11.2009 Validity till: 27.05.2010 Calibration Agency: Internal Testing Date of calibration: 25.05.2010																												

	Validity till: 25.11.2010 Calibration Agency: Internal Testing
Measuring/ Reading/ Recording frequency:	Recording frequency: Hourly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	The meter is checked every six months through internal testing.

Data / Parameter:	Biomass Quantity																																																																										
Data unit:	MT																																																																										
Description:	Quantity of biomass consumed in the project activity																																																																										
Measured /Calculated /Default:	Measured																																																																										
Source of data:	Log books																																																																										
Value(s) of monitored parameter:	<table><tr><th>Month</th><th>Mustard Husk</th><th>Wheat straw</th><th>Paddy waste</th><th>Cotton stick</th></tr><tr><td>Sep-09</td><td>73</td><td>105</td><td>519</td><td>1,772</td></tr><tr><td>Oct-09</td><td>252</td><td>218</td><td>3,526</td><td>2,666</td></tr><tr><td>Nov-09</td><td>183</td><td>6</td><td>4,097</td><td>2,285</td></tr><tr><td>Dec-09</td><td>32</td><td>0</td><td>3,520</td><td>3,250</td></tr><tr><td>Jan-10</td><td>5</td><td>2</td><td>2,815</td><td>3,787</td></tr><tr><td>Feb-10</td><td>4</td><td>4</td><td>2,513</td><td>3,462</td></tr><tr><td>Mar-10</td><td>4</td><td>10</td><td>2,700</td><td>4,100</td></tr><tr><td>Apr-10</td><td>521</td><td>1,938</td><td>1,041</td><td>2,441</td></tr><tr><td>May-10</td><td>306</td><td>1,813</td><td>746</td><td>3,702</td></tr><tr><td>Jun-10</td><td>462</td><td>401</td><td>1,724</td><td>3,120</td></tr><tr><td>Jul-10</td><td>116</td><td>219</td><td>734</td><td>4,345</td></tr><tr><td>Aug-10</td><td>8</td><td>199</td><td>828</td><td>3,815</td></tr><tr><td>TOTAL</td><td>1,965</td><td>4,914</td><td>24,763</td><td>38,745</td></tr></table>					Month	Mustard Husk	Wheat straw	Paddy waste	Cotton stick	Sep-09	73	105	519	1,772	Oct-09	252	218	3,526	2,666	Nov-09	183	6	4,097	2,285	Dec-09	32	0	3,520	3,250	Jan-10	5	2	2,815	3,787	Feb-10	4	4	2,513	3,462	Mar-10	4	10	2,700	4,100	Apr-10	521	1,938	1,041	2,441	May-10	306	1,813	746	3,702	Jun-10	462	401	1,724	3,120	Jul-10	116	219	734	4,345	Aug-10	8	199	828	3,815	TOTAL	1,965	4,914	24,763	38,745
Month	Mustard Husk	Wheat straw	Paddy waste	Cotton stick																																																																							
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Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used for any calculations. Substantiates the power generation from the project activity.																																																																										
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Load Cell</u> Type: Load Cell Serial number: 167205 Model No.: BR011L0 Location: Belt Conveyor Calibration frequency: Annually Date of calibration: 29.05.2009 Validity till: 29.05.2010 Calibration Agency: IPA Private Limited</p> <p><u>Weighbridge</u> Type: Electro-Mechanical Weighbridge Make: Leotronic Model No.: EDS501 Capacity: 30 MT Location: Belt Conveyor Calibration frequency: Annually</p>																																																																										

	<p>Date of calibration: 11.08.2009 Validity till: 11.08.2010 Calibration Agency: Leotronic Scales Private Ltd.</p> <p>Date of calibration: 02.11.2009 Validity till: 02.11.2010 Calibration Agency: Leotronic Scales Private Ltd.</p> <p>Date of calibration: 06.01.2010 Validity till: 06.01.2011 Calibration Agency: Leotronic Scales Private Ltd.</p> <p>Date of calibration: 08.04.2010 Validity till: 08.04.2011 Calibration Agency: Leotronic Scales Private Ltd.</p> <p>Date of calibration: 01.07.2010 Validity till: 01.07.2011 Calibration Agency: Leotronic Scales Private Ltd.</p>
Measuring/ Reading/ Recording frequency:	Recording frequency: Daily
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	<p>The load cell is an online meter used to measure biomass consumption of the project activity.</p> <p>The weighbridge calibration is to be carried out annually but it is conducted on a regular basis (generally three months) to ensure greater accuracy.</p>

Data / Parameter:	Biomass – Calorific Value
Data unit:	kcal/kg
Description:	Calorific value of the different types of biomass fuels used in the project activity
Measured /Calculated /Default:	Measured
Source of data:	Log books
Value(s) of monitored parameter:	<p>Results of calorific value tests conducted on 24th January 2010:</p> <p>Mustard Husk: 3,320 kcal/kg Wheat Straw: 3,458 kcal/kg Paddy waste: 3,168 kcal/kg Cotton stick: 3,489 kcal/kg</p>
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not used for any calculations. Substantiates the power generation from the project activity.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The energy content of biomass is measured in-house using a bomb calorimeter as and when the biomass is received at the power plant site, however the GCV of each type of biomass is reported once in the monitoring report based on the internal audit conducted for calorific value of biomass used.</p> <p>The mass of the combustible charge can vary from less than one gram to 1,100 grams. However, the calories liberated in the test should not be more than 10,000.</p> <p>A sample from the biomass received at plant is taken and tested for its GCV before being used in the boiler. The procedure for measurement of</p>

	the calorific value of biomass using bomb calorimeter is as per standard procedure prescribed in IS: 1350 of the Bureau of Indian Standards (BIS) and ensures standardization of apparatus every time it is used. The procedure is first performed with a sample of benzoic acid whose calorific value is known (6,319 cal/gram) to determine the water equivalent (cal/°C). After determination of the water equivalent, the same procedure is performed with the biomass sample to calculate the calorific value.
Measuring/ Reading/ Recording frequency:	Recording frequency: Once in a year for each type of biomass
Calculation method (if applicable):	$GCV = \frac{T \times W - (CV_T + CV_W)}{M}$ <p>Where,</p> <p>GCV is the calorific value of sample in calories per gram T is the final rise in temperature in °C M is the mass of sample in grams W is the water equivalent in calories per °C CV_T is the calorific value of thread = 2.1/cm CV_W is the calorific value of ignition wire = 2.33/cm</p>
QA/QC procedures applied:	The bomb calorimeter can be used to measure calorific value of a wide range of solid as well as liquid fuels and since it is standardized according to procedures in IS:1350 every time it is used, the uncertainty level of the monitored data is low.

Data / Parameter:	Coal Quantity
Data unit:	MT
Description:	Quantity of coal used in the project activity
Measured /Calculated /Default:	Measured
Source of data:	Log books
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Recording frequency: Daily
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	Coal has not been used by the project proponent in the current monitoring period.

Data / Parameter:	Carbon content in coal
Data unit:	%
Description:	Carbon content of coal used in the project activity
Measured /Calculated	Measured

/Default:	
Source of data:	Test Reports
Value(s) of monitored parameter:	Not applicable
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Recording frequency: For each batch of coal
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	Coal has not been used by the project proponent in the current monitoring period.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

The baseline emissions have been calculated as per the formula presented in section E.1.2.4 of the registered PDD:

$$BE_y = EF_y \times EG_y$$

Where

- BE_y - are the baseline emissions due to displacement of electricity during the year y in tons of CO₂
- EG_y - is the net quantity of electricity generated by the project activity during the year y in MWh, and
- EF_y - is the CO₂ baseline emission factor for the electricity displaced due to the project activity in tons CO₂/MWh

Month	Electricity exported (kWh)	Electricity imported (kWh)	Net Saleable energy (kWh)	Baseline Emission Factor (kgCO ₂ e/kWh)	Baseline Emissions (tCO ₂ e)
Sep 2009	1,662,500	50,500	1,612,000	0.942	1,518
Oct 2009	4,616,500	8,500	4,608,000	0.942	4,340
Nov 2009	4,809,500	10,000	4,799,500	0.942	4,521
Dec 2009	4,808,500	11,000	4,797,500	0.942	4,519
Jan 2010	4,715,000	12,000	4,703,000	0.942	4,430
Feb 2010	4,344,000	13,500	4,330,500	0.942	4,079
Mar 2010	4,460,000	17,000	4,443,000	0.942	4,185
Apr 2010	4,491,500	12,000	4,479,500	0.942	4,219
May 2010	4,888,500	0	4,888,500	0.942	4,604
Jun 2010	4,172,000	20,500	4,151,500	0.942	3,910
Jul 2010	3,791,000	27,000	3,764,000	0.942	3,545
Aug 2010	2,884,500	31,500	2,853,000	0.942	2,687
TOTAL	49,643,500	213,500	49,430,000	-	46,557

E.2. Project emissions calculation

>>

As per registered PDD section E.1.2.1 project emissions would take place from the combustion of coal in the project activity. Since no coal has been consumed in the current monitoring period, project emissions have not been considered.

E.3. Leakage calculation

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As per registered PDD section E.1.2.1 leakage emissions from the transportation of biomass have been ignored.

Further, as per “General guidance on leakage in biomass project activities” Version 03 Paragraph 18, the project participant is required to evaluate once in the beginning of the crediting period if biomass is available in surplus in the region. If it is demonstrated that the surplus biomass is at least 25% larger than the consumption of the region, then leakage emissions due to competing uses of biomass can be neglected.

In accordance with this guidance, an independent third party had conducted a biomass availability study for the project activity. The major findings of the study with respect to the fuels used in the current monitoring period are tabulated below:

Fuel surplus availability analysis

Crop	Generation (MT)	Consumption (MT)			Surplus (MT)	Surplus as % of Consumption
		Muktsar District	MPPL	Total		
Mustard Husk	10,165	0	4,637	4,637	5,528	119.22%
Wheat Straw	1,107,917	644,361	30,104	674,465	433,452	64.27%
Paddy Waste	431,280	239,610	5,018	244,628	186,652	76.30%
Cotton Stick	105,699	0	29,399	29,399	76,300	259.53%

Since all fuels are available in more than 25% surplus of the consumption, leakage emissions due to competing uses of biomass have been neglected.

E.4. Emission reductions calculation / table

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Emissions reductions (ER_y) are calculated using the formula:

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission reductions from the project activity in the year y

BE_y = Baseline Emissions from the project activity in the year y

PE_y = Project Emissions from the project activity in the year y

Month	Baseline Emissions (tCO ₂ e)	Leakage Emissions (tCO ₂ e)	Project Emissions (tCO ₂ e)	Emission Reductions (tCO ₂ e)
Sep 2009	1,518	0	0	1,518
Oct 2009	4,340	0	0	4,340
Nov 2009	4,521	0	0	4,521
Dec 2009	4,519	0	0	4,519
Jan 2010	4,430	0	0	4,430
Feb 2010	4,079	0	0	4,079
Mar 2010	4,185	0	0	4,185
Apr 2010	4,219	0	0	4,219
May 2010	4,604	0	0	4,604
Jun 2010	3,910	0	0	3,910
Jul 2010	3,545	0	0	3,545
Aug 2010	2,687	0	0	2,687
TOTAL	46,557	0	0	46,557

Total baseline emissions: **46,557 tCO₂e**

Total project emissions: **0 tCO₂e**

Total leakage: **0 tCO₂e**

Total emission reductions: **46,557 tCO₂e**

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

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO ₂ e)	45,366	46,557

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

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The emission reductions estimated in the registered PDD are 45,366 tCO₂ per annum. The emission reductions actually achieved in the monitoring period are 46,557 tCO₂. Thus, it can be observed that there has been a slight increase (2.6%) in the emission reductions for the current monitoring period as against the figure estimated in the registered PDD. This can primarily be attributed to better performance of the plant which is reflected in the increase of its Plant Load Factor (PLF) for the current monitoring period.

PLF is defined as the ratio between the gross energy generation of a power plant and the maximum gross energy generation possible in the total monitoring period under consideration. According to the Central Electricity Authority in India, the same can be represented as:-

$$PLF(\%) = \frac{\text{Energy Generated during the period}}{C \times H_{\text{total}}} \times 100$$

Where C is the installed capacity of the unit and H_{total} is the total hours in the period under review (monitoring period).

The estimation of emission reductions in the registered PDD was carried out in tandem with the assumptions in the DPR. Based on these assumptions, the Plant Load Factor (PLF) of the project activity **as per the registered PDD** has been calculated below:

Fixed Ex-ante Emission Factor of grid:	0.942882 kgCO₂/kWh	} (As given in PDD)
Annual estimation of emission reductions:	45,366 tCO₂e	
Net electricity generation from the power plant per annum	= 45,366 / 0.94288	
	= 48,114,000 kWh	
Auxiliary electricity consumption per annum (as per DPR)	= 10%	
	= $\frac{48,114,000}{(1 - \{10/100\})}$	
Gross electricity generation from the power plant per annum	= 53,460,000 kWh	

Total number of hours in the period = 365 × 24 = **8,760 hours**

$$PLF(\%) = \frac{53,460,000}{7.5 \times 1000 \times 8760} = \mathbf{81.37\%}$$

The PLF observed in the **current monitoring period** has been calculated below:

Gross electricity generation in the current monitoring period = **56,026,252 kWh**

Total number of hours in the current monitoring period (365 days) = 365 × 24 = **8,760 hours**

$$PLF(\%) = \frac{56,026,252}{7.5 \times 1000 \times 8760} = \mathbf{85.28\%}$$

This increase in the Plant Load Factor is attributable to a better performance of the plant. The plant personnel have gained significant experience in power plant operations having operated it for the past five years and now possess better technical knowledge of plant Operation and Maintenance (O & M). Further, there are other factors that contribute to this variation such as the quality of biomass (calorific value, moisture content etc.), operating conditions (climate), among others.

All these factors have led to only a slight increase in the electricity generation from the estimation made in the registered PDD and resulted in a corresponding increase in the emission reductions.

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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		