

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 01, 23/11/2011

5 MW Sahu Hydro Electric Project for a grid connected system in Himachal Pradesh, India
Reference number: 1753
Second Monitoring Report: 01/03/2010 to 30/06/2011 (first and last days included)

SECTION A. General description of the project activity

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

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Him Kailash Hydro Power Private Limited has established 5 MW (comprising of 2 X 2.5 MW hydro turbines) Sahu Hydro Electric Project at Paleru Village of Chamba District in Himachal Pradesh, India. The project activity is a run of the river scheme constructed across Sahu Nallah, a tributary of river Ravi in Chamba district. The project activity is generation of electricity for the Himachal Pradesh State Electricity Board (HPSEB) grid system utilizing the hydro potential available in Sahu Nallah tributary of river Ravi in Chamba. Thus electricity is generated through sustainable means without causing any negative effect on the environment.

The project units have been commissioned and are in operation since 22/04/2008. The present monitoring period (2nd Verification) is chosen from 01/03/2010 to 30/06/2011. The net electricity exported to the State grid by the project activity is 30.5149 GWh and the net emission reductions are of 24,197 tCO₂e for the present monitoring period.

The First monitoring period was chosen between 24/06/2009 to 28/02/2010. The net electricity displaced in the first monitoring period was 12.7157GWh and net emission reductions achieved are 10,082 tCO₂e.

A.2. Project Participants

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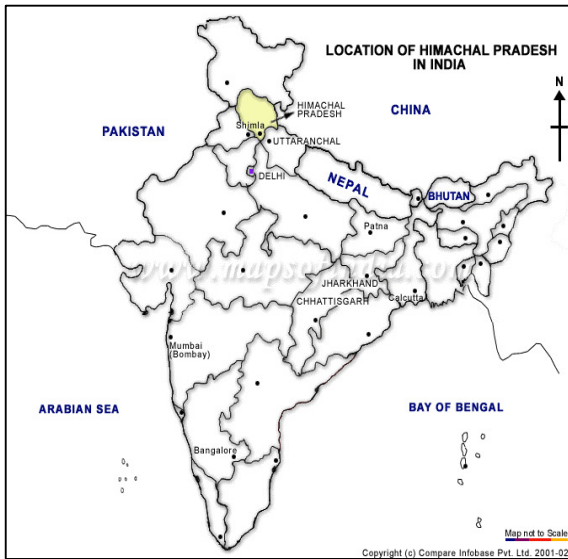
Name of the party involved ((Host) indicates a host party)	Private and/or public entity (ies) project participants	Whether party involved wishes to be considered as project participant
India (Host)	Private Entity: M/s Him Kailash Hydro Power Pvt Ltd	No

A.3. Location of the project activity:

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Village : Paleur
District : Chamba
State : Himachal Pradesh
Country : India.
Latitude : 32° 31' 56" to 32° 39' 44" North
Longitude : 76° 12' 30" to 76° 22' 58" East.

The physical location of the project activity is shown below:



Location of Himachal Pradesh state (Marked in Yellow) in India



Location of Chamba District in Himachal Pradesh state



Location of 5 MW Sahu Hydro Electric Project

Physical location of the Project in Chamba district of Himachal Pradesh State

A.4. Technical description of the project

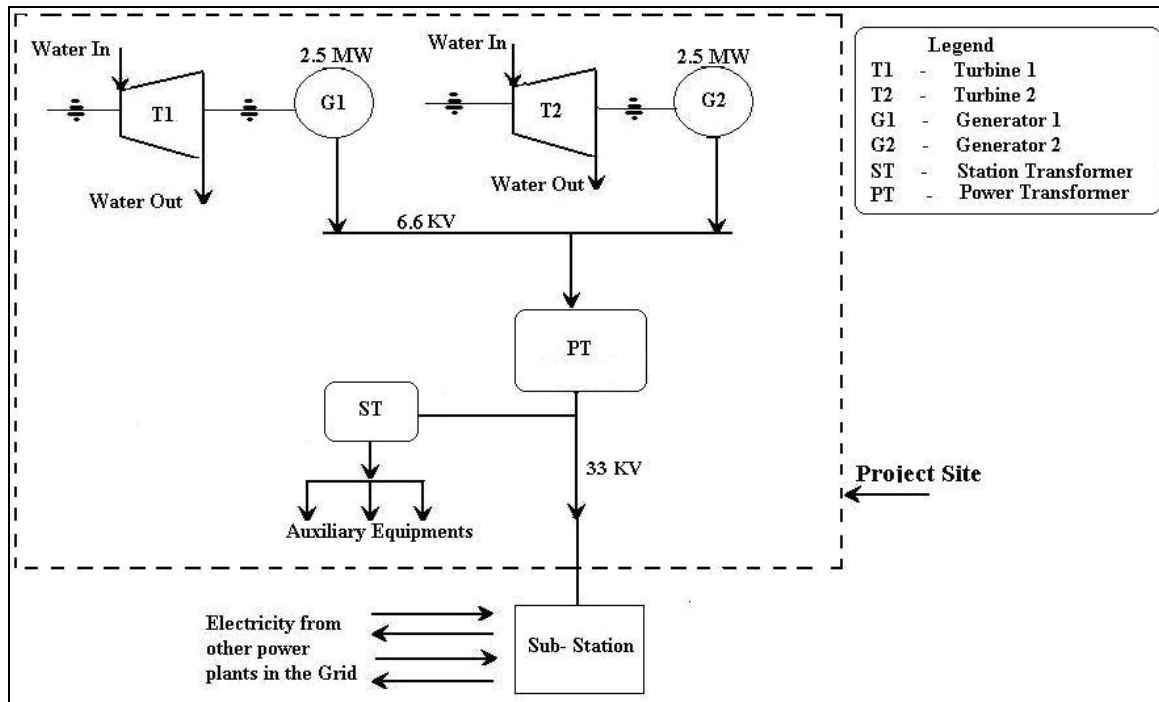
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The technology used for power generation in the hydroelectric plant is, by converting the potential energy of flowing water into mechanical energy using hydro turbines and then to electrical energy by using alternators. The generated power is transformed to match the nearest grid substation for proper interconnection and smooth evacuation of power.

The details of major equipment of the project activity are furnished below:

Equipment Specifications	
Turbine: Model : HL 110-WJ-77 Type : Horizontal Francis Turbine Flow : 1.94 cumecs Head: 174 m Qty. : 2 Nos. Rated Output: 2500 kW Manufacturer: Kunming Electrical Machinery Co. Ltd., China.	Generator: Type : SFW 3000-6 / 1730 Rated Power : 3125 KVA Voltage at Generator terminal: 6.6 kV 1000 RPM, 3 Phase, 50 Hz, 0.8 PF. Qty. : 2 Nos. Manufacturer: Kunming Electrical Machinery Co. Ltd., China.

Detailed technical process diagram of the project activity is furnished below:



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

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Title : **Type I**, Renewable Energy Projects
Reference : **AMS-1.D**, Grid connected renewable electricity generation
Version : **Version 13**, AMS-1.D, Scope : 01, EB 36

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1206606044.99/view>

A.6. Registration date of the project activity:

>>

24/06/2009

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

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24/06/2009 to 23/06/2019 (Fixed)

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

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Name/Entity	Project Participant (Yes/No)
Mr. Ch.V. Narasimha Raju M/s Him Kailash Hydro Power Pvt Ltd Telephone : +91-40-6452 1424 Fax : +91-40-23542128 E-Mail : naresh.hydro@gmail.com	Yes

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

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The project activity has been commissioned on 22/04/2008.and registered with CDM EB on 24/06/2009. The project promoter has installed all monitoring equipments to monitor the parameters, which were described in the registered CDM-PDD.

The details of the project operations during this monitoring period are presented below:

Period	(Hr:MM)	
	Unit-1	Unit-2
Total no. of hours	11688:00	11688:00
Non-running hours	3419:25	3964:40
Running hours ^a	8268:35	7723:20

^aThe plant has been operated effectively by interchanging between the two units during less water flows in the river.

No significant events occurred during this monitoring period, which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

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The monitoring plan of the project activity has been revised and the same has been approved by CDM Executive Board 14/07/2011. For further details of this project, please refer to the following link on the UNFCCC web site. <http://cdm.unfccc.int/Projects/DB/DNV-CUK1206606044.99/view>.

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

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NA

B.4. Notification or request of approval of changes

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There are certain changes observed in the plant & machinery and the same are listed below.

Parameter	As per Reg CDM-PDD	Actual
Type of Turbine	Horizontal Impulse wheel	Horizontal Francis
Generator Voltage	3.3 kV	6.6 kV
Power factor	0.9 (lag)	0.80

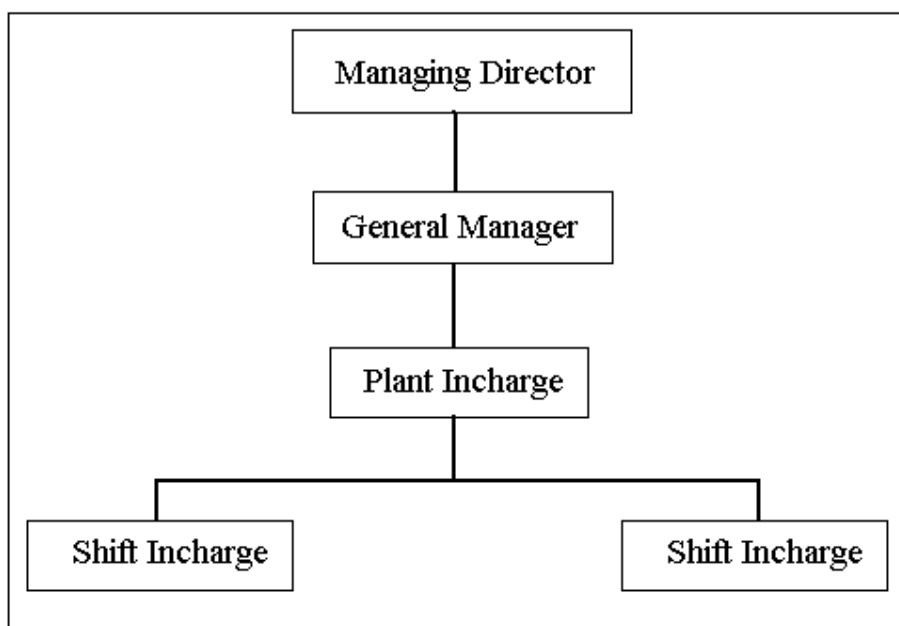
These changes were notified to CDM Executive board and the same is approved by board on 14/07/2011. For further details of this project, please refer to the following link on the UNFCCC web site. <http://cdm.unfccc.int/Projects/DB/DNV-CUK1206606044.99/view>.

SECTION C. Description of the monitoring system

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CDM Monitoring Team

A CDM team has been formed in Him Kailash Hydro Power Pvt. Limited (HKHPPL) for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of HKHPPL. Qualified and trained people monitor the parameters and emission reduction calculations. HKHPPL is the sole agency responsible for implementation and monitoring of the project activity. The monitoring organisation structure is shown below:



Roles and Responsibilities

Managing Director

Managing Director is responsible for the total monitoring plan. He has reviewed the reports regularly and taken necessary corrective action conform to CDM.

General Manager

General Manager has examined the reports generated by the Plant Incharge with respect to the monthly electricity generated; net electricity exported to grid and annual emission reduction calculations as per the monitoring plan. He also examined the internal audit reports prepared by internal auditor and taken care for any deviations in data.

He cross checks the plant operation reports regularly and reports to Managing Director for any abnormality.

Plant Incharge

Plant Incharge is responsible for the electricity generation of the project. He has cross verified and signed the daily plant operation reports regularly and reported to General Manager. The periodical tests of the monitoring equipments have been taken care by the Plant Incharge in line with monitoring plan.

The responsibility of storage and archiving of information in good condition also lies with the Plant Incharge. He also co-ordinates to obtain audit reports as per the monitoring plan from internal auditors.

Shift Incharge

Shift Incharge is responsible for monitoring and recording of monitoring parameters as described in the registered PDD. He collected the recorded data from log sheets of respective sections and prepared the consolidated report on electricity generation, export to grid, diesel consumption, plant shut down time, etc. for a day. He prepared daily reports and submit to the Plant Incharge for review.

Calibration

Separate Main meters and Check meters of 0.2 accuracy class were installed at 33/11 kV sub-station, by HKHPPL for measuring export & import electricity. Each meter is jointly inspected and sealed on behalf of the parties. Main and Check meters are being tested against an accepted laboratory standard meter and certified by Power Grid Corporation of India Ltd. (A Govt. of India Enterprise). The meters are deemed to be working satisfactorily if the errors are within the meter specifications of 0.2s accuracy class. These meters are calibrated once in twelve months, as mentioned in the approved revised CDM-PDD.

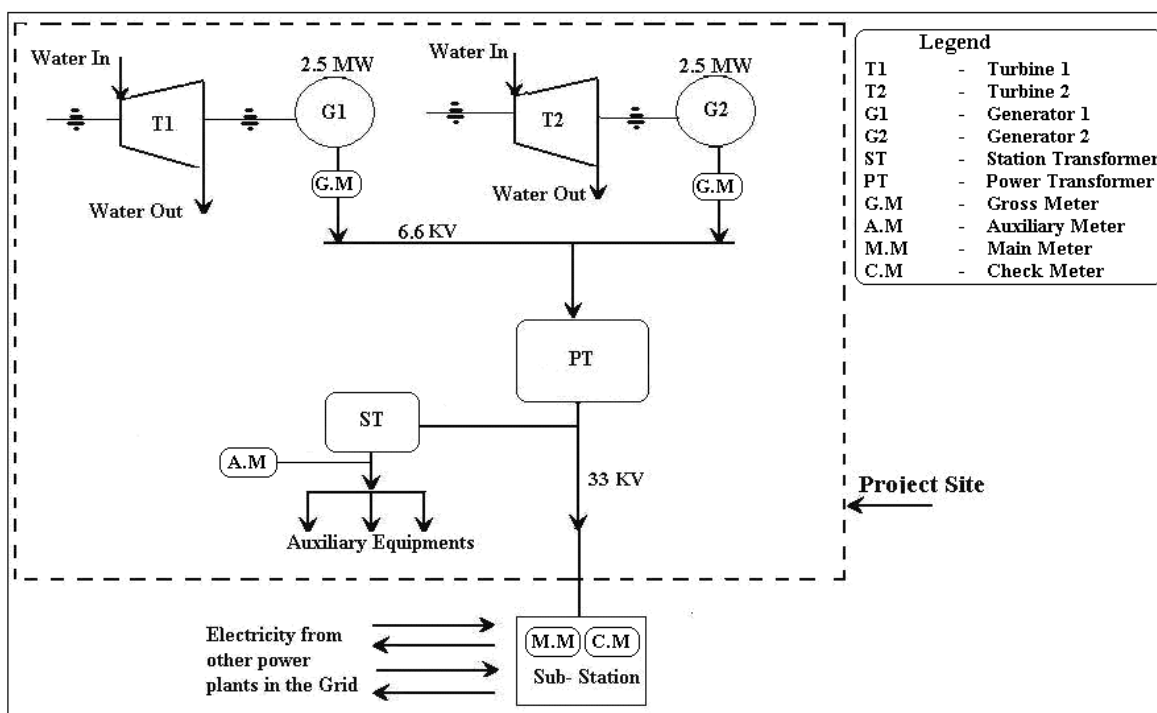
The gross and auxiliary meters are of 0.5 accuracy class, which are installed at project site. These meters are periodically calibrated once every three years as mentioned in the approved revised CDM-PDD.

Methods of data transfer and archiving policy

The gross electricity generated by the project activity and the auxiliary consumption were continuously measured and recorded daily at the project site. Electricity exported to the grid and electricity imported from the grid were continuously measured at the grid substation and monthly Joint Meter Reading (JMR) were recorded. Plant Incharge is responsible for the measuring and record keeping of all the electricity data. The energy is being measured using calibrated meters. Records of Monthly joint meter reading reports were used for emissions reduction calculations. Sales bills / receipts are being used for cross verification of electricity to/from grid as an alternative proof of the electricity exported to the grid.

The above documents will be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as receipts of payments released by HPSEB will also be kept in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

The project had been provided the monitoring equipments which were described in the registered CDM-PDD and the line diagram for the monitoring parameters are furnished below:



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_y
Data unit:	t CO ₂ /GWh
Description:	Combined margin emission factor of Northern Grid
Source of data used:	Central Electricity Authority (CEA), Gov. of India: "CO ₂ Baseline Database", Version 2.0, June 2007. Available at www.cea.nic.in .
Value(s) :	793
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The emission factors in the CO ₂ database of CEA are compiled specifically for application by grid-connected CDM projects. The emission factors are consistent with ACM0002 (Version 6) and AMS I.D (Version 13).
Additional comment:

Data / Parameter:	COEF_i
Data unit:	kg CO ₂ /TJ
Description:	CO ₂ emission coefficient of fuel type i
Source of data used:	IPCC 2006 default values
Value(s) :	74000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	IPCC values have been used for diesel since no country specific data is available.
Additional comment:	The project activity may combust only one type of fossil fuel i.e., diesel during the project operation DG set is used only for lighting for emergency purposes and hence consumption of diesel will be negligible.

D.2. Data and parameters monitored

Data / Parameter:	EG _{gross, y}
Data unit:	GWh
Description:	Total electricity generated by the project during the year y
Measured /Calculated /Default:	Measured
Source of data:	On-site measurements (Daily Plant log books)
Value(s) of monitored parameter:	32.239241 Month wise Generation details are provided in Annex – 1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value is not used in the emission reduction calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Unit – 1: Serial No. : 75689 TM1108 & 243414 TM1110 Type : TM 7400 Accuracy class : 0.5 Calibration Frequency : Once in three years Date of Calibrations : 10/08/2007 & 19/11/2010 Validity : 09/08/2010 & 18/11/2013 Unit – 2: Serial No. : 75691 TM1108 & 243418 TM1110 Type : TM 7400 Accuracy class : 0.5 Calibration Frequency : Once in three years Date of Calibrations : 10/08/2007 & 19/11/2010 Validity : 09/08/2010 & 18/11/2013
Measuring/ Reading/ Recording frequency:	Continuous measurement, daily recording, compiled monthly and aggregated annually.
Calculation method (if applicable):	-----
QA/QC procedures applied:	Measurement - carried out by calibrated meters.

Data / Parameter:	EG _{Auxiliary, y}
Data unit:	GWh
Description:	Auxiliary electricity consumption of the project during the year y
Measured /Calculated /Default:	Measured
Source of data:	On-site measurements (Daily Plant log books)
Value(s) of monitored parameter:	0.086957 Month wise Auxiliary consumption details are provided in Annex – 1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This value is not used in the emission reduction calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Serial No. : 5694 TM0807 & 243425 TM1110 Type : TM 7400 Accuracy class : 0.5 Calibration Frequency : Once in three years Date of Calibrations : 10/08/2007 & 19/11/2010 Validity : 09/08/2010 & 18/11/2013
Measuring/ Reading/ Recording frequency:	Continuous measurement, daily recording, compiled monthly and aggregated annually.

Calculation method (if applicable):	-----
QA/QC procedures applied:	Measurement will be carried out by calibrated meters.

Data / Parameter:	EG _{export,y}
Data unit:	GWh
Description:	Quantity of electricity exported to grid by the project during the year y
Measured /Calculated /Default:	Measured
Source of data:	Measurement at grid sub-station (Monthly Joint meter Readings Certificates issued by HPSEB)
Value(s) of monitored parameter:	30.5175 Month wise Electricity exported to grid are provided in Annex – 1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Main Meter: Serial No. : 07041595 & 07033706 Type : ER 300P Make : L&T Accuracy Class : 0.2s Calibration Frequency : Once in twelve months. Date of Calibration : Details are provided under Table : 1 Check Meter: Serial No. : 07360975 & 07033714 Type : ER 300P Make : L&T Accuracy Class : 0.2s Calibration Frequency : Once in twelve months. Date of Calibration : Details are provided under Table : 1
Measuring/ Reading/ Recording frequency:	Continuous measurement, monthly recording and aggregated annually.
Calculation method (if applicable):	-----
QA/QC procedures applied:	Meters are recalibrated & inspected periodically by HPSEB. Records of measurements are used for verification of emissions reductions. Sales bills / receipts are used for cross verification.

Data / Parameter:	EG _{import,y}
Data unit:	GWh
Description:	Quantity of electricity imported (from grid) by the project plant during the year y
Measured /Calculated /Default:	Measured
Source of data:	Measurement at grid sub-station (Monthly Joint meter Readings Certificates issued by HPSEB)
Value(s) of monitored parameter:	0.0026 Month wise Electricity exported to grid are provided in Annex – 1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type,	Main Meter:

accuracy class, serial number, calibration frequency, date of last calibration, validity)	Serial No. : 07041595 & 07033706 Type : ER 300P Make : L&T Accuracy Class : 0.2s Calibration Frequency : Once in twelve months. Date of Calibration : Details are provided under Table : 1 Check Meter: Serial No. : 07360975 & 07033714 Type : ER 300P Make : L&T Accuracy Class : 0.2s Calibration Frequency : Once in twelve months. Date of Calibration : Details are provided under Table : 1
Measuring/ Reading/ Recording frequency:	Continuous measurement, monthly recording and aggregated annually.
Calculation method (if applicable):	-----
QA/QC procedures applied:	Meters are recalibrated & inspected periodically by HPSEB. Records of measurements are used for verification of emissions reductions. Sales bills / receipts are used for cross verification.

Data / Parameter:	EG _{m,y}
Data unit:	GWh
Description:	Net quantity of electricity exported to grid by the project plant during the year y
Measured /Calculated /Default:	Calculated (as the difference of “EG _{export,y} ” and “EG _{import,y} ”)
Source of data:	---
Value(s) of monitored parameter:	30.5149 Month wise Electricity exported to grid are provided in Annex – 1.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	----
Measuring/ Reading/ Recording frequency:	----
Calculation method (if applicable):	Difference of Electricity exported by the project activity and electricity imported by the project activity.
QA/QC procedures applied:	To be cross-checked with monthly joint meter reading statements, invoices or receipts of payments.

Data / Parameter:	F _{diesel, y}
Data unit:	Liters
Description:	Quantity of Diesel consumed in running DG set during year y
Measured /Calculated /Default:	Measured
Source of data:	Plant records
Value(s) of monitored parameter:	275

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)	The total number of operating hours of DG set and the corresponding quantity of diesel consumed for the purpose was measured by using pre calibrated level gauge and recorded in the log book maintained at the DG set room.
Measuring/ Reading/ Recording frequency:	Recorded monthly.
Calculation method (if applicable):	----
QA/QC procedures applied:	The data recorded can be cross checked against the fuel purchase receipts.

Data / Parameter:	ρ_{diesel}
Data unit:	kg/Lit
Description:	Density of Diesel
Measured /Calculated /Default:	Default value
Source of data:	Society of Indian automobile manufacturers (SIAM) http://www.siamindia.com/scripts/Diesel.aspx
Value(s) of monitored parameter:	0.845
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)	---
Measuring/ Reading/ Recording frequency:	---
Calculation method (if applicable):	---
QA/QC procedures applied:	Project participant has no control on the parameter. Hence, no QA/QC procedures are applicable

Table- 1: Main Meter & Check Meter Recalibration Test Details

	Serial No.	Period of usage	Date of calibration
Main Meter	07041595	01/03/2010 to 10/06/2010	06/11/2009
Check Meter	07360975		
Main Meter	07033706	10/06/2010 to 09/12/2010	17/04/2010
Check Meter	07033714		
Main Meter	07041595	09/12/2010 to 10/06/2011	09/11/2010
Check Meter	07360975		
Main Meter	07033706	10/06/2011 to 01/08/2011	20/05/2011
Check Meter	07033714		

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

The baseline emissions are calculated as follows:

$$BE_y = EG_{m,y} \cdot EF_y$$

Where EF_y : Baseline emission factor for a given year (tCO₂/GWh)
 $EG_{m,y}$: net electricity export to grid in a given year (GWh)

As mentioned under sec.B.4 of registered CDM-PDD, the project has taken the baseline emission factor 793 tCO₂/GWh (ex-ante) for estimation of baseline emissions.

$$EG_{m,y} = 30.5149 \text{ GWh}$$

$$EF_y = 793 \text{ tCO}_2/\text{GWh}$$

$$\text{Hence } BE_y = 30.5149 \cdot 793 = 24,198 \text{ tCO}_2 \text{ (after rounding down conservatively)}$$

E.2. Project emissions calculation

>>

As the project is equipped with diesel generator to meet the emergency requirements of power house etc., emissions out of usage of fossil fuel (diesel) are being accounted as project emissions by using the following equation.

$$PE_y = F_{i,y} \times COEF_i$$

Where,

PE_y : Project emissions from combustion of fossil fuel (diesel for DG set) in the project activity during the year y

$F_{i,y}$: Quantity of fossil fuel type i combusted (DG set) during the year y
= 195 Liters * 0.845 kg/liter
= 164.775 kg

$COEF_i$: Carbon dioxide emission coefficient of the fuel type

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i$$

Where,

NCV_i : Net calorific value of diesel (43 TJ/Gg as per IPCC 2006 default value)

$EF_{CO_2,i}$: CO₂ emission factor of Diesel (74.1 t CO₂/TJ as per IPCC 2006 default value)

$OXID_i$: Oxidation factor of the coal (1 as per IPCC 2006 default value).

$$\begin{aligned} \text{Hence } PE_y &= 275 \cdot 0.845 \cdot 43 \cdot 74.1 \cdot 1 / 10^6 \\ &= 1 \text{ tCO}_2. \text{ (After rounding up conservatively)} \end{aligned}$$

E.3. Leakage calculation

>>

Since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity, hence leakage considered as zero.

$$Ly = 0$$

E.4. Emission reductions calculation / table

>>

Emissions reductions for the monitored period

The following formula is adopted for calculating emission reductions generated by the project activity:

$$ER_y = BE_y - PE_y - L_y$$

Where ER_y is emission reductions in a given year
 BE_y is baseline emissions in a given year
 PE_y is project emissions in a given year
 L_y is leakage in a given year

Total baseline emissions : **24,198 tCO₂e**
Total project emissions : **1 tCO₂e**
Total leakage : **0 tCO₂e**
Total emission reductions : **24,197 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 (tCO₂e)	21,958*	24,197

*Note: As per registered CDM-PDD annual emission reductions per year (i.e., 365 days) is 16,457 tCO₂e. Whereas this monitoring period is considered for 16 months (i.e 487 days). The estimated emission reductions for the period of 16 months are adjusted to number of days available in the monitoring period i.e, $(16,457/365)*487 = 21,958$ tCO₂e.

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

>>

The emission reductions occurred during the reported period is 10.2 % more than the estimated in the registered PDD. The reason for the excess electricity generation compared to the estimate in the CDM-PDD is that the excess rainfall and snow melting in the catchments area of river Sahu Nallah valley was above normal for the region which resulted in the availability of excess water flows in the river.

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		

Annex -1

Consolidated Report for Monitored Parameters during the Monitoring Period

Monitored Period		Gross Electricity Generation [EG _{gross,y}], kWh			Auxiliary consumption [EG _{Auxiliary,y}]	Electricity Exported to Grid [EG _{export,y}]	Electricity Imported from Grid [EG _{import,y}]	Net Electricity Exported [EG _{m,y}]	
Month	Year	Unit - I	Unit - II	Total	kWh	kWh	kWh	kWh	GWh
March	2010	0	1,162,675	1,162,675	4,510	1,082,400	0	1,082,400	1.0824
April	2010	23,250	1,201,325	1,224,575	4,110	1,131,500	0	1,131,500	1.1315
May	2010	895,750	545,500	1,441,250	3,750	1,361,500	0	1,361,500	1.3615
June	2010	856,500	935,500	1,792,000	4,030	1,687,200	500	1,686,700	1.6867
July	2010	1,635,500	1,565,250	3,200,750	6,820	3,016,100	1,100	3,015,000	3.0150
August	2010	2,016,250	2,083,750	4,100,000	9,990	3,988,100	0	3,988,100	3.9881
September	2010	1,799,500	1,952,750	3,752,250	7,960	3,568,200	900	3,567,300	3.5673
October	2010	1,329,250	1,358,000	2,687,250	6,540	2,503,400	100	2,503,300	2.5033
November	2010	974,250	590,000	1,564,250	4,550	1,464,000	0	1,464,000	1.4640
December	2010	552,750	469,250	1,022,000	7,190	946,900	0	946,900	0.9469
January	2011	821,750	0	821,750	6,670	761,100	0	761,100	0.7611
February	2011	936,757	0	936,757	6,100	870,100	0	870,100	0.8701
March	2011	340,998	1,075,641	1,416,639	4,050	1,344,900	0	1,344,900	1.3449
April	2011	1,469,727	406,663	1,876,390	3,820	1,772,100	0	1,772,100	1.7721
May	2011	1,040,698	1,667,201	2,707,899	3,457	2,580,800	0	2,580,800	2.5808
June	2011	841,640	1,691,166	2,532,806	3,410	2,439,200	0	2,439,200	2.4392
Total		15,534,570	16,704,671	32,239,241	86,957	30,517,500	2,600	30,514,900	30.5149