



MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Hydroelectric Project in Kinnaur District in Himachal Pradesh
Reference number of the project activity	4993
Version number of the monitoring report	1
Completion date of the monitoring report	17/09/2012
Registration date of the project activity	12/04/2012
Monitoring period number and duration of this monitoring period	Monitoring period: 1 Monitoring period: 12/04/2012 – 31/07/2012
Project participant(s)	Jaypee Karcham Hydro Corporation Limited (Private Entity)
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 1 (Energy Industries – Renewable/non-renewable sources) Applied Methodology: ACM0002 version 12 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	16,42,950 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	16,29,040 tCO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Government of India and the Government of Himachal Pradesh (GOHP) have identified the Sutlej River as an important source of hydropower and have initiated hydroelectric projects along Sutlej and its Tributaries. The project has been executed by Jaypee Karcham Hydro Corporation Limited (JKHCL), a special purpose vehicle formed by the promoter group Jaiprakash Associates Limited (JAL). Prior to the start of the project activity the existing demand in the Northern Region Grid was met through its existing fossil fuel based (coal, gas and diesel), nuclear, hydro and renewable energy based power plants.

The project activity has been devised to alleviate acute shortage of electricity generation capacity in the Northern Region of India especially at the time of system peak load by developing a 4 X 250 MW renewable and versatile run of the river hydro power project at Karcham & Wangtoo on the river Satluj in Himachal Pradesh. The project activity includes a concrete gravity diversion dam at Karcham; power intakes and 4 underground desilting chambers to exclude all particles above 0.2 mm size; 10.48 m diameter and 17 km long head race tunnel; an underground power house complex at Wangtoo to generate 4 X 250 MW power and 1.3 km long tail race tunnel to discharge the water back into river Satluj. In doing so, it will delay the necessity of construction of either a coal or gas or oil fired thermal power plant of similar capacity to supply to the primarily fossil fuel based regional grid, leading to reduction of Carbon Dioxide (CO₂) emissions in the atmosphere.

This is a new hydroelectric project, with a small reservoir of area 588400 m² having a power density of 1699.52 W/m². Construction work at project site started from 18th November 2005 and the project activity has started generation of power from 26 May 2011.

A.2. Location of project activity

The project activity is located on the stretch of Satluj River between Karcham and Wangtoo in the District of Kinnaur of Himachal Pradesh. The geographic coordinates of the project area are the following:

Latitude - 31°30'50'' - 31°32'10'' N
Longitude - 78°11'15'' - 78°01'05'' E

Nearest broad gauge railway station is Kalka under Northern Railway which is 290 kms from the project site. The nearest airport to the project site is Shimla, which is 210 km from Karcham Wangtoo site. The airport is connected to the project site by a paved road. The location is further depicted in the following map:





A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Country)	Jaypee Karcham Hydro Corporation Limited (Private Entity)	No

A.4. Reference of applied methodology

Title of the baseline methodology: “Consolidated Baseline Methodology for grid connected electricity generation from renewable sources”

Reference: ACM0002, Version 12.1.0 (EB 58), Sectoral scope: 1

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM website (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>).

A.5. Crediting period of project activity

Crediting period: 12/04/2012 – 11/04/2022 (10 year period)

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

The 1st unit of 250 MW got commissioned on 26/05/2011, the second unit on 23/06/2011, third unit on 08/09/2011 and the project got fully commissioned, i.e. the fourth unit got commissioned on 13/09/2011.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

No revision has been sought for the monitoring plan and there is no deviation from applied methodology

B.2.2. Corrections

No correction has been done in the registered project activity

B.2.3. Permanent changes from registered monitoring plan or applied methodology

No revision has been sought for the monitoring plan and there is no deviation from applied methodology

B.2.4. Changes to project design of registered project activity

No revision has been done in the project design of the registered project activity

B.2.5. Changes to start date of crediting period

There is no change in the start date of the crediting period of the project activity

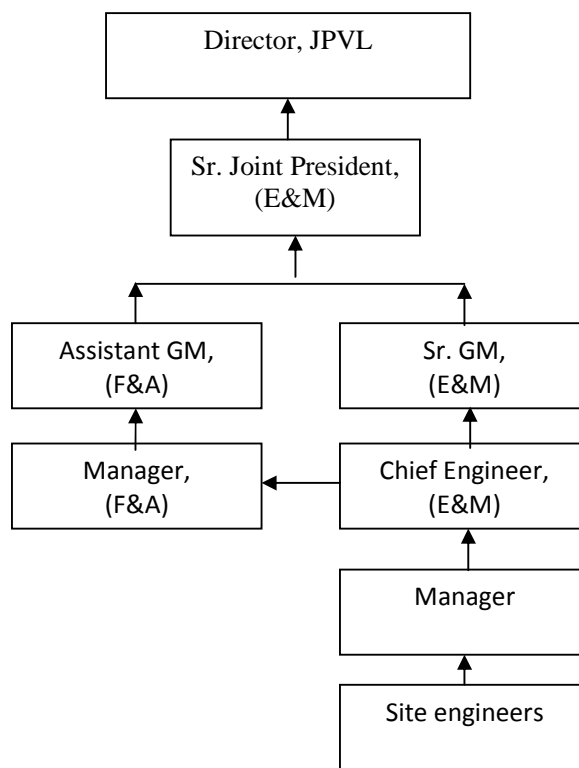
B.2.6. Types of changes specific to afforestation or reforestation project activity

Not Applicable as it is a Hydro-electric Power project

SECTION C. Description of monitoring system

The monitoring plan is being devised as per approved consolidated methodology ACM0002 - “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

The O&M structure for the CDM project activity is as follows:



A project team is constituted with participation from relevant departments. Personnel are trained on concept and monitoring plan. This team is responsible for data collection and archiving. This team meets periodically to review project activity, check data collected, emissions reductions etc. On a weekly basis, the monitoring reports are checked and discussed by the senior team members/managers. In case of any irregularity observed by any of the team member, it is informed to the concerned person for necessary action. On monthly basis, these reports are forwarded at the management level.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	EF _{OM,y}
Unit	tCO ₂ /GWh
Description	Operating Margin emission factor for NEWNE regional grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 4.0
Value(s) applied	1.0086
Purpose of data	It is calculated in accordance with the Tool to calculate the emission factor for an electricity system with 3years vintage data (2005-06, 2006-07, 2007-2008) on Net Generation provided by CEA with an option of ex ante calculation based on Simple Operating Margin Method. Computed once during PDD finalization.
Additional comment	The data will be archived for two years beyond the crediting period.



Data/Parameter	EF_{BM,y}
Unit	tCO ₂ /GWh
Description	Build Margin emission factor for NEWNE regional grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 4.0
Value(s) applied	597.7
Purpose of data	CEA has Calculated it as per ACM0002 for the year 2007-08. The build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation and option of ex ante calculation. Computed once during PDD finalization.
Additional comment	The data will be archived for two years beyond the crediting period.

Data/Parameter	EF_{grid,CM,y}
Unit	tCO ₂ /GWh
Description	Combined Margin CO ₂ emission factor for NEWNE regional grid
Source of data	Estimated figure based on 50% of OM and 50% of BM values
Value(s) applied	803.1 tCO ₂ /GWh
Purpose of data	It is calculated it as per Tool to calculate the emission factor for an electricity system (Version 02) with 3years vintage data and option of ex ante calculation based on 50% of OM and 50% of BM values approach. Computed once during PDD finalization.
Additional comment	The data will be archived for two years beyond the crediting period.

Data/Parameter	A_{BL}
Unit	m ²
Description	Area of the reservoir (m ²) measured in the surface of the water, before the implementation of the project activity, when the reservoir is full. For new reservoirs, this value is zero.
Source of data	Project Site.
Value(s) applied	0
Purpose of data	Measured from topographical surveys, maps, satellite pictures, etc.
Additional comment	-

Data/Parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero.
Source of data	Project Site.
Value(s) applied	0
Purpose of data	Determine the installed capacity based on recognized standards.
Additional comment	-



D.2. Data and parameters monitored

Data/Parameter	EG _{facility,y}																																
Unit	MWh																																
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year																																
Measured/Calculated /Default	Measured at the project site (Pothead Yard)																																
Source of data	Meters are installed in the switchyard for export/import to Abdullahapur grid and Jhakri grid. There are two lines for each grid through which the electricity is exported / imported. Apart from this the energy generated by the BASPA-II – 300 MW project of Jaypee (upstream of the Jaypee Karcham Wangtoo Hydro-electric Plant) is also being supplied to grid through the same sub- station under a Loop-in-loop-out (LILO) arrangement.																																
Value(s) of monitored parameter	2028439.51																																
Monitoring equipment	<p>The metering system includes a main meter and a back-up check meter of accuracy class 0.2% . All meter data is automatically recorded and is submitted to Northern Region Load Despatch Centre (NRLDC) on weekly basis.</p> <p><i>Abdullahapur grid main meter:</i></p> <table border="1"> <tr><td>S. No.</td><td>NP-6992-A</td></tr> <tr><td>Model</td><td>Radian</td></tr> <tr><td>Class</td><td>0.2s</td></tr> <tr><td>Date of Calibration</td><td>01/06/2010</td></tr> </table> <table border="1"> <tr><td>S. No.</td><td>NP-7009-A</td></tr> <tr><td>Model</td><td>Radian</td></tr> <tr><td>Class</td><td>0.2s</td></tr> <tr><td>Date of Calibration</td><td>01/06/2010</td></tr> </table> <p><i>Abdullahapur grid check meter:</i></p> <table border="1"> <tr><td>S. No.</td><td>NP-7010-A</td></tr> <tr><td>Model</td><td>Radian</td></tr> <tr><td>Class</td><td>0.2s</td></tr> <tr><td>Date of Calibration</td><td>01/06/2010</td></tr> </table> <table border="1"> <tr><td>S. No.</td><td>NP-7008-A</td></tr> <tr><td>Model</td><td>Radian</td></tr> <tr><td>Class</td><td>0.2s</td></tr> <tr><td>Date of Calibration</td><td>01/06/2010</td></tr> </table>	S. No.	NP-6992-A	Model	Radian	Class	0.2s	Date of Calibration	01/06/2010	S. No.	NP-7009-A	Model	Radian	Class	0.2s	Date of Calibration	01/06/2010	S. No.	NP-7010-A	Model	Radian	Class	0.2s	Date of Calibration	01/06/2010	S. No.	NP-7008-A	Model	Radian	Class	0.2s	Date of Calibration	01/06/2010
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*Jhakri grid main meter:*

S. No.	NP-6987-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

S. No.	NP-6976-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

Jhakri grid check meter:

S. No.	NP-6985-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

S. No.	NP-6969-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

Baspa II - main meter:

S. No.	NP-7007-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

S. No.	NP-6989-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010

Baspa II - check meter:

S. No.	*NP-7006-A
Model	Radian
Class	0.2s
Date of Calibration	01/06/2010



	S. No.	NP-6988-A
	Model	Radian
	Class	0.2s
	Date of Calibration	01/06/2010
	The check meter at Baspa-II (NP-7006-A) went out of order on 14.05.2012. was replaced on 05/06/2012 and the details of the new meter are as follows:	
	S. No.	NP-7132-A
	Model	Radian
	Class	0.2s
	Date of Calibration	18/01/2011
	Measuring/Reading/Recording frequency	Monitoring frequency: Hourly measurement Recording frequency: Monthly in the ER calculation sheet
Calculation method (if applicable)	The net electricity generation is directly monitored on hourly basis from the meters	
QA/QC procedures	The meters shall be calibrated on 2 year basis.	
Purpose of data	For calculation of baseline emissions	
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.	



Data/Parameter	TEG_y	
Unit	MWh	
Description	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads in a year.	
Measured/Calculated /Default	The meter reading of the electricity generated is being monitored on hourly basis.	
Source of data	Daily progress report	
Value(s) of monitored parameter	2043958.12	
Monitoring equipment	<i>Unit – 1 meter</i>	
	S. No.	NP-6966-A
	Model	Radian
	Class	0.2s
	Date of Calibration	01/06/2010
	<i>Unit – 2 meter</i>	
	S. No.	NP-6965-A
	Model	Radian
	Class	0.2s
	Date of Calibration	01/06/2010
	<i>Unit – 3 meter</i>	
	S. No.	NP-6967-A
	Model	Radian
	Class	0.2s
	Date of Calibration	01/06/2010
	<i>Unit – 4 meter</i>	
	S. No.	NP-6968-A
	Model	Radian
	Class	0.2s
	Date of Calibration	01/06/2010
Measuring/Reading/ Recording frequency	Monitoring frequency: Hourly measurement Recording frequency: Monthly in the ER calculation sheet	
Calculation method (if applicable)	NA	
QA/QC procedures	The meters shall be calibrated on 2 year basis.	
Purpose of data	For cross check of net generation	
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.	



Data/Parameter	Cap_{PJ}
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Measured/Calculated /Default	-
Source of data	Commissioning certificates
Value(s) of monitored parameter	250 * 4 * 10 ⁶
Monitoring equipment	-
Measuring/Reading/ Recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	-
Additional comment	-

Data/Parameter	A_{PJ}
Unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Measured/Calculated /Default	Calculated from measured values
Source of data	Measured by actual surveys conducted at project site by JKHCL from December 2010 to January 2011.
Value(s) of monitored parameter	563344
Monitoring equipment	Topographic survey
Measuring/Reading/ Recording frequency	-
Calculation method (if applicable)	Calculated using stream profile and valley cross sections
QA/QC procedures	As per IS 5477 (Part 1): 1999 (reaffirmed 2004) – Fixing the capacities of reservoirs – Methods – Part I – General Requirements (1 st revision)
Purpose of data	-
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

D.3. Implementation of sampling plan

Not Applicable for the project activity

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

The data used for the calculation of the baseline emission factor was obtained from the baseline calculations published by the CEA, Baseline Carbon Dioxide Emissions from Power Sector – Version 4.0 which uses ACM0002

The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$$

Where:

BE_y	=	Baseline emissions in year y (tCO ₂ /yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the version 02 of the “Tool to calculate the emission factor for an electricity system”

$$\begin{aligned} BE_y &= EG_{PJ,y} \cdot EF_{grid,CM,y} \\ &= 2028440.41 * 803.1 \\ &= 1,629,040 \text{ tCO}_2\text{e} \end{aligned}$$

E.2. Calculation of project emissions or actual net GHG removals by sinks

The power density of the project activity is 1699.52 W/m². Since the power density of the project is greater than 10 W/m²: PE_y = 0.

E.3. Calculation of leakage

According to ACM0002, leakage emissions are nil.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
Total	16,29,040	0	0	16,29,040

**E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD**

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO ₂ e)	16,42,950	16,29,040

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

The electricity generation depends on the availability of water which was estimated envisaging a 90% dependable year. A slight fluctuation in the water availability from the envisaged figure may result in difference of values from registered PDD. The difference is however very small, i.e. 0.85% in the estimated emission reductions.

History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance		