



**Monitoring report form  
(Version 03.2)**

**Monitoring report**

<b>Title of the project activity</b>	24 MW Bhilangana - III Hydro Power Project
<b>Reference number of the project activity</b>	2936
<b>Version number of the monitoring report</b>	01
<b>Completion date of the monitoring report</b>	18/03/2014
<b>Registration date of the project activity</b>	03/03/2010
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring period : First ( 1 <sup>st</sup> ) Duration of monitoring period: 20/12/2011 to 28/02/2014
<b>Project participant(s)</b>	Bhilangana Hydro Power Limited
<b>Host Party(ies)</b>	India
<b>Sectoral scope(s) and applied methodology(ies)</b>	Sectoral Scope : 1 Methodology : ACM0002 Version 08
<b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>	301,236 tCO <sub>2</sub>
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>	162,800 tCO <sub>2</sub>
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)</b>	82,465 tCO <sub>2</sub>
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).</b>	80,335 tCO <sub>2</sub>

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

&gt;&gt;

Bhilangana - III (B-III) is a run-of-the-river 24 MW (consisting 3 units of 8 MW each) Hydro Power Project located at Village Ghuttu, Tehsil Ghansali, District Tehri, Uttarakhand State, India. The project activity contemplates utilization of water of Bhilangana River, a tributary of the river Bhagirathi, for setting up an environmentally benign project for generation of electricity. The project activity is implemented by Bhilangana Hydro Power Limited (BHPL) with the objective of ensuring effective and efficient utilization of natural resources, coupled with responsible environmental consideration, which are vital for achieving sustainable development in India.

The main components of the project activity comprises of a diversion weir, head regulator constructed integrally with the weir, intake channel, desilting chamber, power channel, head race tunnel, surge shaft, steel lined tunnel and penstock with its trifurcations, power house to accommodate 3x8 MW horizontal axis Francis turbine, switchyard and tailrace system.

The three units of the project activity were commissioned as per the detail tabulated hereunder and are operating successfully since then

SN	Unit	Capacity	Commissioning Date
1	I	8 MW	23/12/2011
2	II	8 MW	16/01/2012
3	III	8 MW	20/12/2011

The plant does not involve any type of displacement, rehabilitation or relocation. The project activity is generating electricity successfully by converting the potential of kinetic energy of the water and the renewable electricity produced thereby replace the equivalent amount of electricity produced from thermal stations and thus reduce green house gas emission, which would have occurred otherwise, in absence of the project. The power generated by the project is sold to the State Utility / Private Purchaser.

**Equipment Detail**

Equipment	Number	Suppliers
Horizontal Synchronous Generator	3 X 12.5 MVA	T D Power Systems Pvt.Ltd.
Horizontal Francis Turbine	3 X 8 MW	Voith Hydro Pvt.Ltd.

The project activity was completed as planned and described in the Project Design Document.

The current monitoring period covers the period from 20/12/2011 (i.e. start date of crediting period) to 28/02/2014. During the present monitoring period i.e. 20/12/2011 to 28/02/2014, the project activity has fed net energy into the grid 200,889,320 MWh and has achieved 162,800 tCO<sub>2</sub> emissions reductions.

**A.2. Location of project activity**

&gt;&gt;

Latitude : 30°33'07" N, Longitude : 78°48'26" E  
 Village : Ghuttu  
 District : Tehri Garwal  
 Tehsil : Ghansali  
 State : Uttarakhand  
 Country : India

**A.3. Parties and project participant(s)**

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project (as applicable) participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Bhilangana Hydro Power Limited	No

**A.4. Reference of applied methodology**

&gt;&gt;

Type I : Energy industries (renewable - / non-renewable sources)  
 Category : Consolidated methodology for grid-connected electricity generation from renewable sources  
 Version : ACM0002 Version 08

**A.5. Crediting period of project activity**

&gt;&gt;

Crediting period for this project activity is 20/12/2011 to 19/12/2021 (Fixed).

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

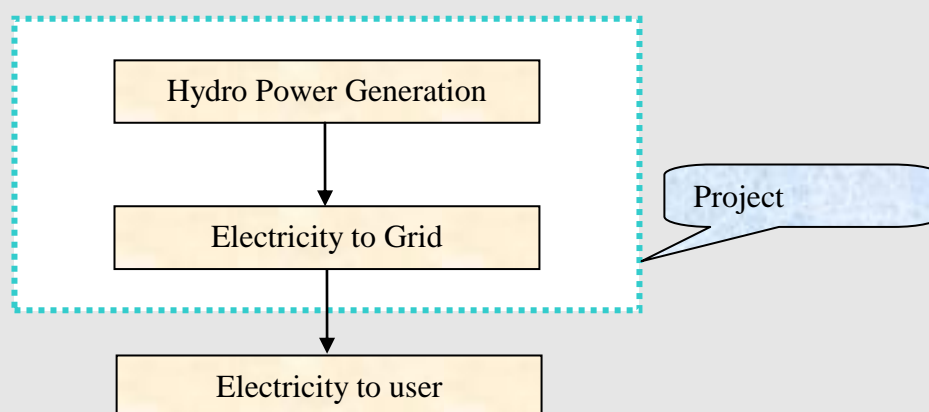
&gt;&gt;

The project activity got registered with the CDM EB on 03/03/2010.

Three units of the project activity were commissioned on dates as mentioned below:

SN	Unit	Capacity	Commissioning Date
1	I	8 MW	23/12/2011
2	II	8 MW	16/01/2012
3	III	8 MW	20/12/2011

The project proponent has installed all monitoring equipment to monitor the parameters which were described in the registered CDM PDD.



The project activity is in continuous operation since the date of commissioning. No special events or change of equipments have taken place during the current monitoring period.

No events occurred during the current monitoring period which may have affected the applicability of the methodology.

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

&gt;&gt;

Not Applicable

**B.2.2. Corrections**

&gt;&gt;

Not Applicable

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

&gt;&gt;

Not Applicable

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

&gt;&gt;

Not Applicable

**B.2.5. Changes to start date of crediting period**

&gt;&gt;

Yes, start date of the crediting period has been changed from 01/04/2010 to 20/12/2011

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

&gt;&gt;

Not Applicable

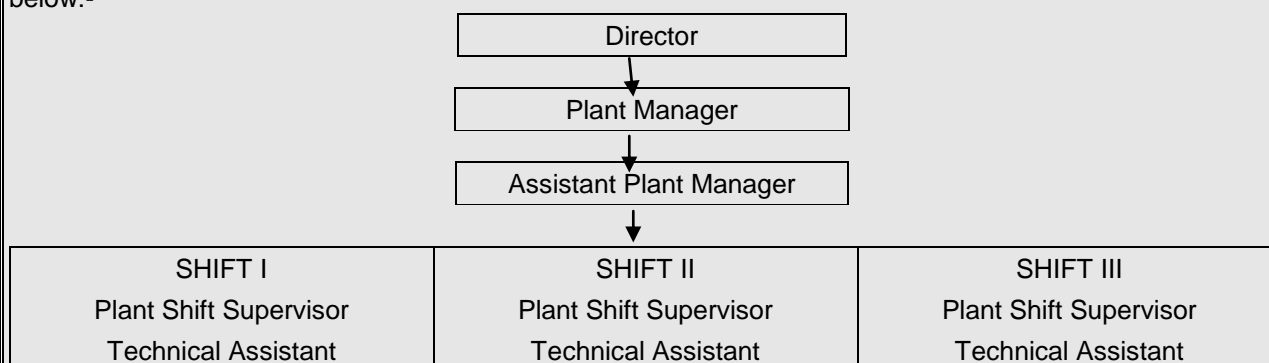
**SECTION C. Description of monitoring system**

&gt;&gt;

For this project activity, the monitoring systems and procedures followed are as described below:

1. The Energy exported (MWh) to the Grid and Energy imported(MWh) from the Grid have been measured by bi-directional main meter and backup check meter installed at the interconnection point i.e. switchyard;
2. The Net Electricity fed by the project activity into the grid has been calculated as the difference between the energy exported and energy imported from the grid. It is based on records maintained at BHPL site;
3. The electricity produced by the project activity has been measured by the energy meters installed at the generator panels and is being recorded monthly;
4. Monthly reports stating the energy exported, energy imported and electricity produced are prepared by shift-in-charge and verified by plant managers.

The Organizational structure responsible for monitoring the various parameters as per Monitoring Plan is as below:-



Shift supervisor monitors and record the monthly data of net deliverable energy at the power house for their corresponding shift in the plant log sheet. At the end of each shift, the recorded data is reviewed by the shift-in-charge. The daily and monthly data is checked and verified by the Plant Manager.

As per the registered PDD main meter readings will be the basis for calculating emissions reductions. In case of failure of main meter, check meter readings will be decisive for calculating emissions reductions

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

<b>Data / Parameter:</b>	<b>EF<sub>grid, CM, Y</sub></b>
Unit:	tCO <sub>2</sub> / MWh
Description:	The Grid Emission Factor has been calculated as the weighted average of the Operating Margin Emission Factor (EF <sub>OM</sub> ) and the Build Margin Emission Factor (EF <sub>BM</sub> ).
Source of data:	Northern Regional Grid – baseline carbon dioxide emission data base, version 08 given by Central Electricity Authority, CEA.
Value(s) applied:	0.8104
Purpose of data:	Baseline emission calculations
Additional comment:	The parameter is fixed ex-ante for the full crediting period

**D.2. Data and parameters monitored**

<b>Data / Parameter:</b>	<b>TEG<sub>y</sub></b>		
Unit:	MWh		
Description:	Total electricity produced by the project activity in year y		
Measured/Calculated /Default:	Measured		
Source of data:	Records at BHPL site		
Value(s) of monitored parameter:	202,238,070		
Monitoring equipment:	Type	Unit I: Conserve Digital Energy Meter Unit II: Conserve Digital Energy Meter Unit III: Conserve Digital Energy Meter	
	Accuracy Class	+- 0.50%	
	Serial number	<b>Unit-I</b>	<b>Unit-II</b>
		169183/2415-0209	169183/2405-0209
	Calibration frequency	Once in every two years	
	Calibration during monitoring period	<b>Unit-I</b>	<b>Unit-II</b>
		10/11/2011 (valid till 09/11/2013) 01/11/2013 (valid till 31/10/2015)	10/11/2011 (valid till 09/11/2013) 01/11/2013 (valid till 31/10/2015)
Measuring/Reading/Recording frequency:	Continuous monitoring and monthly recording		
Calculation method (if applicable):	Not applicable		
QA/QC procedures:	The total electricity produced by the project activity is monitored through energy meter of accuracy class of 0.5 or better installed in the plant and is recorded on monthly basis. The energy meters are calibrated at least once in every two years.		
Purpose of data:	This data is not used for emission reduction calculation.		
Additional comment:	The data will be archived electronically and will be kept at least for 2 years after the end of last crediting period.		

<b>Data / Parameter:</b>	<b>EG<sub>y</sub></b>																																														
Unit:	MWh																																														
Description:	Net Electricity Fed by the project activity into the grid/Licensee in year y																																														
Measured/Calculated /Default:	Calculated																																														
Source of data:	Records at BHPL site																																														
Value(s) of monitored parameter:	200,889,320																																														
Monitoring equipment:	<p><b>Main Meter</b></p> <table border="1"> <tr><td>Type</td><td>L&amp;T Electronic bidirectional trivector meter</td></tr> <tr><td>Accuracy Class</td><td>+/- 0.20%</td></tr> <tr><td>Serial number</td><td>12090633 *</td></tr> <tr><td>Calibration frequency</td><td>Once in a year</td></tr> <tr><td>Period of Usage</td><td>10/04/2012 to till date</td></tr> <tr><td>Calibration during monitoring period</td><td>12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)</td></tr> </table> <p>* indicate replacement of meter on 10/04/2012 the details of which is as under:</p> <table border="1"> <tr><td>Type</td><td>L&amp;T Electronic bidirectional trivector meter</td></tr> <tr><td>Accuracy Class</td><td>+/- 0.20%</td></tr> <tr><td>Old meter no.</td><td>8039977</td></tr> <tr><td>New meter no</td><td>12090633</td></tr> <tr><td>Period of Usage</td><td>12/11/2011 to 10/04/2012</td></tr> <tr><td>Date of Change</td><td>10/04/2012</td></tr> </table> <p><b>Check Meter</b></p> <table border="1"> <tr><td>Type</td><td>L&amp;T Electronic bidirectional trivector meter</td></tr> <tr><td>Accuracy Class</td><td>+/- 0.20%</td></tr> <tr><td>Serial number</td><td>12090669*</td></tr> <tr><td>Calibration frequency</td><td>Once in a year</td></tr> <tr><td>Calibration during monitoring period</td><td>12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)</td></tr> </table> <p>* indicate replacement of meter on 10/04/2012 the details of which is as under:</p> <table border="1"> <tr><td>Type</td><td>L&amp;T Electronic bidirectional trivector meter</td></tr> <tr><td>Accuracy Class</td><td>+/- 0.20%</td></tr> <tr><td>Old meter no.</td><td>8039978</td></tr> <tr><td>New meter no</td><td>12090669</td></tr> <tr><td>Period of Usage</td><td>12/11/2011 to 10/04/2012</td></tr> <tr><td>Date of Change</td><td>10/04/2012</td></tr> </table>	Type	L&T Electronic bidirectional trivector meter	Accuracy Class	+/- 0.20%	Serial number	12090633 *	Calibration frequency	Once in a year	Period of Usage	10/04/2012 to till date	Calibration during monitoring period	12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)	Type	L&T Electronic bidirectional trivector meter	Accuracy Class	+/- 0.20%	Old meter no.	8039977	New meter no	12090633	Period of Usage	12/11/2011 to 10/04/2012	Date of Change	10/04/2012	Type	L&T Electronic bidirectional trivector meter	Accuracy Class	+/- 0.20%	Serial number	12090669*	Calibration frequency	Once in a year	Calibration during monitoring period	12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)	Type	L&T Electronic bidirectional trivector meter	Accuracy Class	+/- 0.20%	Old meter no.	8039978	New meter no	12090669	Period of Usage	12/11/2011 to 10/04/2012	Date of Change	10/04/2012
Type	L&T Electronic bidirectional trivector meter																																														
Accuracy Class	+/- 0.20%																																														
Serial number	12090633 *																																														
Calibration frequency	Once in a year																																														
Period of Usage	10/04/2012 to till date																																														
Calibration during monitoring period	12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)																																														
Type	L&T Electronic bidirectional trivector meter																																														
Accuracy Class	+/- 0.20%																																														
Old meter no.	8039977																																														
New meter no	12090633																																														
Period of Usage	12/11/2011 to 10/04/2012																																														
Date of Change	10/04/2012																																														
Type	L&T Electronic bidirectional trivector meter																																														
Accuracy Class	+/- 0.20%																																														
Serial number	12090669*																																														
Calibration frequency	Once in a year																																														
Calibration during monitoring period	12/09/2011 (valid till 11/09/2012) 27/03/2012 (valid till 26/03/2013) 26/03/2013 (valid till 25/03/2014)																																														
Type	L&T Electronic bidirectional trivector meter																																														
Accuracy Class	+/- 0.20%																																														
Old meter no.	8039978																																														
New meter no	12090669																																														
Period of Usage	12/11/2011 to 10/04/2012																																														
Date of Change	10/04/2012																																														
Measuring/Reading/Recording frequency:	Continuous monitoring and monthly recording																																														
Calculation method (if applicable):	Net Electricity Exported to the Grid = Energy exported to the Grid – Energy imported from the Grid																																														

QA/QC procedures:	<p>Net electricity exported to the grid is calculated as the difference between energy exported and imported from the grid.</p> <p>Net Electricity exported to the grid by the project activity is monitored through energy meter of accuracy class of 0.2 or better installed at the interconnection point i.e. switchyard and is recorded on monthly basis.</p> <p>Net Electricity exported by the project activity into the grid is cross checked by invoices / statements including invoice raised on the trader and / or invoices raised on the third party for the energy not taken by the trader and / or statement of unscheduled interchange and / or statement from Power Transmission Corporation of Uttarakhand Limited. The energy meters are calibrated at least annually.</p>
Purpose of data:	To calculate baseline emission
Additional comment:	The data will be archived electronically and will be kept at least for 2 years after the end of last crediting period.

### D.3. Implementation of sampling plan

>>100 percent data is monitored, no data or parameters have been determined by sampling approach, hence not applicable.

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

&gt;&gt;

SN	Description	Formula	Unit	Value
A	Energy Exported		kWh	201,066,220
B	Energy Imported		kWh	176,900
C	Net Saleable Energy	$C = A - B$	kWh	200,889,320
D	Carbon Emission Factor as per the baseline adopted		kg CO <sub>2</sub> /kWh	0.8104
E	Baseline Emissions	$E = (C * D) / 1,000$	ton CO <sub>2</sub>	162,800

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

&gt;&gt;

No project emissions are associated with the project activity during this monitoring period. This is also in line with the PDD and methodology.

**E.3. Calculation of leakage**

&gt;&gt;

As the energy generating equipment is not transferred from another activity or the existing equipment is also not transferred to another activity, leakage is not considered. The same is in line with the methodology and the registered PDD.

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO <sub>2</sub> e)
Total	162,800	Nil	NA	162,800

**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 (t CO <sub>2</sub> e)	301,236	162,800

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

&gt;&gt;

The actual emission reductions during this monitoring period are less than estimated value in the registered PDD for the equivalent time period.

**E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards**

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	82,465	80,335



**Annexure - I**

The month wise data on total electricity produced by the project activity is given hereunder. The monthly data is based on the reading taken at the meters installed at the generation end:

**Energy Generated (kWh)**

<b>Billing Month</b>	<b>Year</b>	<b>Generation</b>
20 Dec 11 to 31 Jan 12	2011-12	6,512,900
Feb	2012	4,947,000
Mar	2012	8,217,670
Apr	2012	11,668,160
May	2012	15,738,000
Jun	2012	14,005,000
Jul	2012	6,500,000
Aug	2012	6,468,600
Sep	2012	6,366,000
Oct	2012	9,550,000
Nov	2012	7,007,000
Dec	2012	5,353,000
Jan	2013	3,900,000
Feb	2013	70,000
Mar	2013	0
Apr	2013	0
May	2013	12,247,800
Jun	2013	10,019,000
Jul	2013	10,664,940
Aug	2013	11,791,000
Sep	2013	12,148,000
Oct	2013	13,923,000
Nov	2013	8,536,000
Dec	2013	6,930,000
Jan	2014	5,143,000
Feb	2014	4,532,000
	<b>Total</b>	<b>202,238,070</b>

## Annexure – II

Month-wise data on net energy exported to the grid for the monitoring period is given as under:  
As per the Project Design Document, Emission reductions are to be calculated based on the energy exported minus energy imported during shut-down and start-ups by the power plant.

Billing Month	Year	Energy Exported to grid (in kWH)	Energy Imported from grid (in kWH)	Net Energy exported to grid (in kWH)
20 Dec 11 to 31 Jan 12	2011-12	6,446,000	6,000	6,440,000
Feb	2012	4,920,000	0	4,920,000
Mar	2012	8,188,000	0	8,188,000
Apr	2012	11,610,460	200	11,610,260
May	2012	15,687,780	180	15,687,600
Jun	2012	13,939,560	1,220	13,938,340
Jul	2012	6,457,120	13,600	6,443,520
Aug	2012	6,426,200	4,960	6,421,240
Sep	2012	6,326,540	280	6,326,260
Oct	2012	9,514,700	80	9,514,620
Nov	2012	6,964,740	20	6,964,720
Dec	2012	5,304,140	80	5,304,060
Jan	2013	3,862,280	500	3,861,780
Feb	2013	64,000	47,680	16,320
Mar	2013	0	37,960	-37,960
Apr	2013	0	45,800	-45,800
May	2013	12,209,560	8,760	12,200,800
Jun	2013	9,955,280	4,760	9,950,520
Jul	2013	10,638,160	3,000	10,635,160
Aug	2013	11,742,940	1,060	11,741,880
Sep	2013	12,071,700	40	12,071,660
Oct	2013	13,819,240	60	13,819,180
Nov	2013	8,474,960	20	8,474,940
Dec	2013	6,879,240	460	6,878,780
Jan	2014	5,083,760	160	5,083,600
Feb	2014	4,479,860	20	4,479,840
	<b>Total</b>	<b>201,066,220</b>	<b>176,900</b>	<b>200,889,320</b>

-----

**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory		
Document Type: Form		
Business Function: issuance		
Keywords: monitoring report, performance monitoring		