

86 MW Hydro Project in Himachal Pradesh

Monitoring Report- Sixth VER Verification (Total Emission Reductions- 198,328 tCO₂e)

Monitoring Period: 01/04/2010 to 30/09/2010 (Inclusive of both days)

Version: 3.0

Date: 11/11/2010

Malana Power Company Limited

Bhilwara Towers, A-12, Sector -1

Noida-201301

Uttar Pradesh, India

Table of Contents

1.0 Project Details	3
1.1 Technology Description	3
2.0 References.....	3
3.0 Monitoring Methodology and Plan	4
4.0 Quality Control (QC) and Quality Assurance (QA)	4
5.0 GHG Calculations	4
5.1 Project Activity Emissions.....	4
5.2 Leakages	4
5.3 Baseline Emissions	5
5.4 Emission Reductions.....	7
6. Duration of Outages.....	8
7. Meter Calibration.....	9
8. Comparison between actual VERs generated v/s VERs estimated in the registered PD	111
Annex-1	122
Annex-2	166
Annex -3	177

1.0 Project Details

The purpose of the project activity is to generate electricity by using the renewable energy source (water) for a grid system at village Jari, Kullu District, Himachal Pradesh, India. The project activity displaces electricity and green house gases (GHG) emissions currently produced by thermal fossil fuel-burning facilities. The generated electricity by the project activity is being exported to the PTC (Power Trading Company) India Ltd. This electricity is further delivered to Punjab State Electricity Board (PSEB) which falls under NEWNE grid.

1.1 Technology Description

The project is a grid connected hydel power plant which is run of the river type with a small reservoir. It involved construction of a barrage across Malana Nallah 3 Km downstream of Malana village, a head regulator, a de-silting basin storage reservoir to divert water draft of 21cumecs through a 3.2 Km long headrace tunnel, ending in a 5 m diameter surge shaft. A pressure shaft conveys water through a 2.2 m diameter surface penstock to 2 Pelton turbines, each of capacity 43 MW totaling to 86 MW plant capacity, housed in a surface powerhouse. Generated electricity is fed into NEWNE grid which has been made by synchronizing Northern, Eastern, Western and North Eastern Grids (NEWNE) of India.

2.0 References

Methodology: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” Reference: Approved consolidated baseline methodology; ACM0002/Version 06, Sectoral Scope: 1, 19 May 2006¹.

Project Description:

Title: “86 MW Hydro Project in Himachal Pradesh”

Version: 02, Dated: 25/12/2006

Revision in Monitoring Plan: Revised monitoring plan dated 07/12/ 2009

History of Issuance

Issuance	Period Covered	VCUs issued
First	05/07/2001 – 31/03/2007	1,344,912
Second	01/04/2007 – 31/03/2008	252,069
Third	01/04/2008 – 31/03/2009	266,898

¹http://cdm.unfccc.int/UserManagement/FileStorage/CDMWf_AM_BW759ID58ST5YEEV6WUCN5744MN763

Fourth	01/04/2009 – 30/09/2009	181,223
Fifth	01/10/2009 – 31/03/2010	45,737

3.0 Monitoring Methodology and Plan

The project activity meets the applicability criteria of the ‘Approved baseline methodology ACM0002/Version 06’. The applicability criteria of the ‘Approved monitoring methodology ACM0002’ are identical to those of the ‘Approved baseline methodology ACM0002/Version 06’. Therefore the project activity has used the ‘Approved monitoring methodology ACM0002/Version 06’ in conjugation with the ‘Approved baseline methodology ACM0002/ Version 06’ for the project activity.

In keeping with the Monitoring Methodology, the following parameter is to be monitored in the specific project situation:

- Net electricity supplied to the state grid by project activity.
- Electricity supplied by Toss Hydro Electric Project (HEP) to the Malana Associate Transmission System (ATS) at Malana Bus Bar.

4.0 Monitoring detail and Quality Control (QC)/ Quality Assurance (QA)

Please Refer Annex-1 for QA/QC and monitoring detail of the project activity.

5.0 GHG Calculations

5.1 Project Activity Emissions

Since, the proposed project activity is a renewable energy project which generates electricity using hydro power; no anthropogenic emissions by sources of greenhouse gases within the project boundary are identified.

5.2 Leakages

No anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity are identified. Hence, no leakage is considered from the project activity. In addition, project proponents confirm that the renewable energy technology is not equipment transferred from another activity. Hence, no leakage calculation is required.

5.3 Baseline Emissions

“The baseline is the MWh produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO₂equ/MWh) calculated in a transparent and conservative manner as:

$$BE_y = EF_y \times EG_y$$

Where,

BE_y: Baseline emissions due to displacement of electricity during year y in tons of tCO₂e

EG_y: Electricity supplied to the grid by the project activity during the year y in MWh,

EF_y: CO₂ baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO₂/MWh.

Energy supplied to Grid

The energy supplied to grid is measured using electricity meters located at Bajaura substation. The net electricity supplied is measured as

$$EG_y = \text{Total Generation} - \text{Auxiliary Consumption} - \text{Transmission Losses}$$

Effective from 11th August 2009, Injection of Toss Hydro Electric Project (HEP) power was allowed in Malana Associate Transmission System (ATS) at Malana Bus Bar. The calculation of Auxiliary consumption and transmission losses are based on combined energy sent out & combined energy injected at Bajaura Sub Station. The calculation for Auxiliary consumption and transmission losses for Malana HEP is as follow.

Sr. No.	Particulars	Tool for measurement	Source
1	Malana Generation Point	Meter at Malana	Actual from JMR Reading
2	Energy sent out by Toss HEP	Meter in Toss incoming line	Readings Being recorded by HPSEB

3	Total Energy sent out by Malana and Toss HEP	Meter at Malana BUS	Actual from JMR Reading
4	Auxiliary Consumption by Malana HEP	Calculations $= (1+2 -3)$	Readings at 1,2,&3
5	Energy sent out by Malana	Calculations $= (1 - 4)$	Readings at 1,2
6	Energy Injected at Bajoura substation	Meter at Bajoura substation	Actual from JMR Reading
7	Transmission losses up to Bajoura substation (Total)	Calculations $= (6-3)$	
8	Share of Losses of Malana HEP	Calculations $= [\text{Total losses (7)} \times \text{Power sent out by Malana (5)}] / [\text{Total power sent out by Malana + Toss (3)}]$	
9	Share of Losses of Toss HEP	Calculations $= [\text{Total losses(7)} \times \text{Power sent out by Toss(2)}] / [\text{Total power sent out Malana + Toss (3)}]$	
10	Energy Injected by Malana HEP at Bajaura Substation	Calculations $= [\text{Malana Generation (1)} - \text{Auxiliary Consumption by Malana (4)} - \text{Share of losses Malana (8)}]$	

Reference: Authenticate Letter issued by HPSEB, 12 October, 2009

Annual power generation details are as follows (all figures in KWh)

Month	Gross generation (KWh)	Auxiliary Consumption (KWh)	Transmission Loss (KWh)	Energy Supplied to Grid EG_y (kWh)
Apr-10	16,969,152	32,616.000	87,038.111	16,849,497.889
May-10	26,897,024	64,721.660	149,341.834	26,682,960.506
Jun-10	36,376,781	73,183.550	254,014.416	36,049,583.034
Jul-10	64,314,176	96,598.730	1,069,440.994	63,148,136.276
Aug-10	69,084,832	93,163.200	1,184,515.191	67,807,153.609
Sep-10	54,606,880	68,460.220	638,260.553	53,900,159.227
Total	268,248,845	428,743.360	3,382,611.098	264,437,490.542

Grid Emission Factor

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value
OM	0.98
BM	0.53
CM	0.75

Therefore, $EF_y = 0.75 \text{ tCO}_2/\text{MWh}$

Baseline Emissions

Formula for Baseline emissions as discussed is $EG_y * EF_y$

Month	Net Generation (EG _y) (MWh)	Emission Factor (EF _y) (tCO ₂ /MWh)	Baseline emissions (BE _y) (tCO ₂ e)
Apr-10	16,849.498	0.75	12,637.12
May-10	26,682.961	0.75	20,012.22
Jun-10	36,049.583	0.75	27,037.19
Jul-10	63148.136	0.75	47361.10
Aug-10	67807.154	0.75	50855.37
Till 2 nd Sep 10	3593.344	0.75	2695.01
Total VERs generated till 2nd September 2010			160598
From 3 rd Sep to 30 th Sep-10	50306.815	0.75	37730
Grand Total			198,328

5.4 Emission Reductions

$$ER_y = BE_y - PE_y - L_y$$

BE_y = Baseline Emissions as calculated in Section 5.3

PE_y = Project émissions = 0

L_y = Leakages = 0

So $ER_y = BE_y$

Emission Reductions

Month	Emission Reductions, (tCO ₂ e)
Apr-10	12,637.12
May-10	20,012.22
Jun-10	27,037.19
Jul-10	47,361.10
Aug-10	50,855.37
Sep-10	40,425.12
Grand Total (01st April-30th September- 10)	198,328

Hence, total Emission Reductions of **198,328 tCO₂e** are achieved by project activity from 01st April 2010 to 30th September 2010.

6. Duration of Outages

Month	Shutdown period (in hours)		Reason
	Unit 1	Unit 2	
April-10	-	0:05	Due to power surge in line m/c tripped
	0.41	-	Due to problem in operation of Excitation System (Aux. Over voltage SST)
May-10	0:35	0:35	Problem in Synch, Trolley
Jun-10		0:49	Grid fail
	1:04	1:09	Due to emergency shutdown of PPV
	12:20	12:14	Due to shut down taken by ADHPL
Jul-10	8:55	9:05	Due to shut down taken by ADHPL
		0:25	Due to emergency shutdown relay operated
	2:44	-	Due to problem in instantaneous over current relay of AVR-1
	2:33	2:42	Grid fail
Aug-10	3:09	2:24	Grid fail

	-	5:48	stator earth fault relay operated
Sep-10	3:09	2:58	Grid fail
	6:00	5:57	Disconnection of ADHPL Line from Malana-Bajaura line at chhrodnallah (t-39)

7. Meter Calibration

Electricity meters are properly maintained with regular calibration schedules to ensure accuracy. Data on electricity supplied to the grid could also be cross-checked with the invoices for sale of electricity to the consumers. The meters installed are of accuracy class 0.2 and are calibrated on annual basis.

Calibration Details of Trivector Meters installed at Malana Generation End					
Main/Check	End	Meter Sr. No.	Calibration Valid from	Calibration Valid upto	Remarks
Main Meter	Gen.-1	KRB00280	24.07.2009	23.07.2010	Replaced with AB0013A on 08.06.2010
		AB0013A	06.05.2010	05.05.2011	
	Gen.-2	KRB00282	27.07.2009	26.07.2010	Replaced with AB0014A on 08.06.2010
		AB0014A	10.05.2010	09.05.2011	
Check Meter	Gen.-1	AB0013A	09.04.2009	08.04.2010	Replaced with KRB00279 on 08.04.2010
		KRB00279	15.03.2010	14.03.2011	
	Gen.-2	AB0014A	09.04.2009	08.04.2010	Replaced with KRB00281 on 08.04.2010
		KRB00281	15.03.2010	14.03.2011	Replaced with KRB00282 on 08.06.2010
		KRB00282	27.07.2009	26.07.2010	Replaced with KRB00280 on 26.07.2010
		KRB00280	09.07.2010	08.07.2011	

Calibration Details of Trivector Meters installed at Malana Transmission End .

Main/Check	End	Meter Sr. No.	Calibration Valid from	Calibration Valid upto	Remarks
Main Meter	Line-1	AB0001A	09.04.2009	08.04.2010	Replaced with AB0010A on 08.04.2010
		AB0010A	12.03.2010	11.03.2011	
	Line-2	AB0003A	09.04.2009	08.04.2010	Replaced with AB0006A on 08.04.2010
		AB0006A	15.03.2010	14.03.2011	
Check Meter	Line-1	AB0002A	09.04.2009	08.04.2010	Replaced with AB0011A on 08.04.2010
		AB0011A	12.03.2010	11.03.2011	
	Line-2	AB0004A	09.04.2009	08.04.2010	Replaced with AB0012A on 20.10.2009
		AB0012A	06.10.2009	05.10.2010	

Calibration Details of Trivector Meters installed at Malana Receiving End (Bajaura Substation).

Main/Check	End	Meter Sr. No.	Calibration Valid from	Calibration Valid upto	Remarks
Main Meter	Line-1	AB0008A	16.07.2009	15.07.2010	Replaced with AB0001A on 08.06.2010
		AB0001A	11.05.2010	10.05.2011	Replaced with KRB09865 on 27.08.2010
		KRB09865	12.03.2010	11.03.2011	
	Line-2	AB0007A	12.06.2009	11.06.2010	Replaced with AB0003A on 08.06.2010
		AB0003A	10.05.2010	09.05.2011	
Check Meter	Line-1	AB0009A	16.07.2009	15.07.2010	Replaced with AB0002A on 08.06.2010
		AB0002A	11.05.2010	10.05.2011	
	Line-2	AB0005A	24.07.2009	23.07.2010	Replaced with AB0004A on 08.06.2010
		AB0004A	06.05.2010	05.05.2011	

Black shaded cell are meters which are currently installed for metering the electricity generation

Toss HEP Energy Meters

Main Meter	L&T Meter	09142987	28.01.2010	27.01.2011
Check Meter	L&T Meter	09142630	28.01.2010	27.01.2011

Spare meters have been kept to replace with installed meters while doing calibration or failures of meters. Detail of the meters is provided below:

S.N.	Meter Serial Number
1	AB0005A
2	AB0007A
3	AB0008A
4	AB0009A
5	AB0001A
6	KRB00281
7	KRB00282

8. Comparison between actual VERs generated v/s VERs estimated in the registered PD

Description	Values (tCO ₂ e)
VERs Claimed in Registered PD for 12 months	273,849
Actual VERs Reduction during the current monitoring period (April-10 to Sep-10)	198,328
Actual VERs Reduction during the previous verification (Monitoring period Oct-09 to Mar-10)	45,737
Actual VERs generated in a year (Oct-2009 to Sep-2010)	244,065
Difference in estimated VERs in PD and actual generated VERs (tCO ₂ e)	-29,784
Difference in estimated ERs in PD and actual generated ERs in %	-10.88% ²

² The actual emission reductions by the project activity in the year (October-09- September-10) is less than the estimated reductions claimed in the validated PD by 10.88% .This is due to low PLF achieved in the year.

Annex-1

Monitoring details of project activity:

In this project the emissions reductions depend on following factors.

1. Electricity supplied by project activity to the grid during a year.
2. The ex-ante fixed Grid Emission Factor for northern region grid. Now Northern region grid has been synchronized with NEWNE grid by Central Electricity Board, Government of India

Frequency-

The electricity generation, electricity sent out and the electricity injected at the substation are measured on continuous basis and hourly logs are prepared by the shift in-charge. At the end of the day, hourly data is aggregated in a daily report.

Report generation on monitoring-

Following reports/ records are available for electricity generation, electricity sent out and electricity injected at the substation.

Hourly log- these are the hourly logbooks maintained by the shift in charge.

Daily report- These are the report prepared by compiling the hourly logbook

Monthly Joint Meter Reading- Monthly JMR of the month contains meter readings of whole month at 3 locations, viz, (i) generation point, (ii) Malana yard (Sent Out point) and (iii) the substation at Bajaura.

Data Archiving and Control -

Data is electronically archived by *shift-incharge*. The log sheets in original are also maintained at the site. The *Assistant Manager (Electrical)* takes due care in cross checking the data and in proper archiving of the data both in soft and hard forms. Finally data is cross-checked by the *General Manager*, MPCL.

Reliability-

All the meters are of 0.2 accuracy class and are calibrated on annual basis.

The data on generation and export are regularly cross checked for any anomalies. The monthly JMR are taken by both the HPSEB and MPCL personnel.

As described in PD the following data values shall be monitored to calculate the emission reductions.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	The units supplied by the project activity (hydel power project) to the Northern, Eastern, Western and North-Eastern (NEWNE) grid during a year.
Source of data used:	Meters installed at three locations, at generation point, plant sent out point and at Bajaura Substation, accurately monitors electricity supplied to the grid. Joint Meter readings taken at all three stations have been used to achieve the parameter EG _y .
Value applied:	264437.490
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity meters are properly maintained with regular calibration schedules developed as per the technical specification requirements to ensure accuracy. Electricity supply data to the grid could also be cross-checked with the invoices for sale of electricity to the consumers.
QA / QC procedure applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department. Accuracy Class of meters : 0.2 %
Any comment:	-

As per revision in monitoring plan, in addition to EG_y (Net electricity supplied by project activity), EG_{y, Toss} (Electricity supplied by Toss Hydro Electric Project (HEP) to the Malana transmission line) has to be monitored.

Data / Parameter:	EG_{y, Toss}
Data unit:	MWh
Description:	The units/ Energy supplied by the Toss Hydel Power Project (HEP)

	to the Malana transmission line at Malana Yard.
Source of data used:	Monthly meter readings issued by Himachal Pradesh State Electricity Board (HPSEB).
Value applied:	33033.295
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity meters are properly maintained with regular calibration schedules by state electricity board.
QA / QC procedure applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department. Accuracy Class of meters : 0.2%
Any comment:	-

Monitoring Details of Toss HEP:

Frequency-

Electricity supplied to Malana transmission line at Malana Yard is measured on continuous basis and hourly logs are prepared by the shift in-charge employed by HPSEB. At the end of the day, hourly data is aggregated in a daily report.

Report generation on monitoring-

Following reports are available on monitoring station:

Hourly log- These are the hourly logbooks maintained by the shift in charge

Daily report- These are the report prepared by compiling the hourly logbook

Monthly report- Monthly report prepared and issued by HPSEB

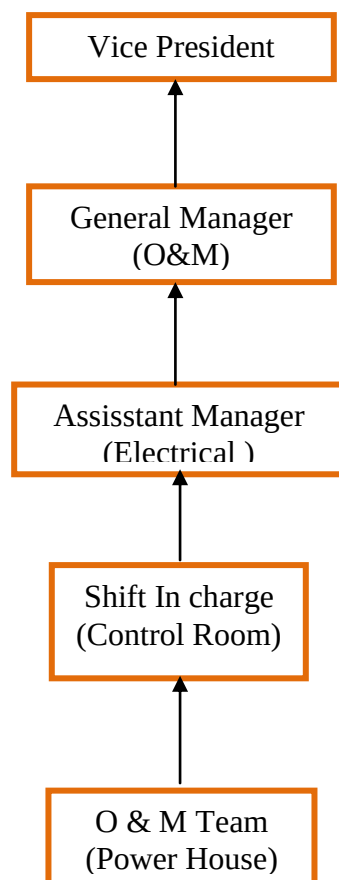
Data Archiving and Control: The log sheets in original are also maintained at the site. Data generated from Toss HEP is collected and archived electronically at Malana project site by *shift-in charge*. The *Assistant Manager (Electrical) of MPCL* takes due care in cross checking the data and in proper archiving of the data both in soft and hard forms. Finally data is cross-checked by the *General Manager, MPCL*.

Reliability-

To ensure the accuracy of meter readings, all the meters are calibrated on annual basis. The data on generation and export are regularly cross checked for any anomalies.

Annex-2

An organogram regarding the hierarchy of monitoring and data QA/QC



Annex -3

Contact details:

Mr O.P. Ajmera

Vice President Finance

Malana Power Company Limited (Also a project participant)

Bhilwara Towers, A-12, Sector -1

Noida-201301

Uttar Pradesh, India

Contact Number

91-120-2541810, 91-120-2531648