

86 MW Hydro Project in Himachal Pradesh

Monitoring Report- Fifth VER Verification (Total Emission Reductions- 45,737 tCO₂e)

Monitoring Period: 01/10/2009 to 31/03/2010 (Inclusive of both days)

Version: 1.0

Date: 02/04/2010

Malana Power Company Limited

Bhilwara Towers, A-12, Sector -1

Noida-201301

Uttar Pradesh, India

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1.0 Project Details

The purpose of the project activity is to generate electricity by using the renewable energy sources (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 NWENE 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 NWENE grid which has been made by synchronizing with Northern, Eastern, Western and North Eastern Grids (NEWNE).

2.0 Reference

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 2006.

Project Description:

Title: “86 MW Hydro Project in Himachal Pradesh”

Version: 02, Dated: 25/12/2006

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
Fourth	01/04/2009 – 30/09/2009	181,223
Fifth	01/10/2009 – 01/03/2010	45737 (Estimated under Current Verification)

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.

4.0 Quality Control (QC) and Quality Assurance (QA)

Refer Annex-1

4.1 Calibration/Maintenance of Measuring and Analytical Instruments

Electricity meters are properly maintained with regular testing and 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.

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:

The weighted average emissions (in tCO₂equ/MWh) of the current generation mix.

$$BE_y = EF_y \times EG_y$$

Where,

BE_y: Baseline emissions due to displacement of electricity during year y in tons of CO₂

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 Auxilliary 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	Meter in Toss incoming line	Readings Being recorded by HPSEB

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

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)
October-09	18730144	83364	72555	18,574,225
November-09	10839680	46696	38652	10,754,332
December-09	7780448	36628	25356	7,718,464
January-10	6338272	13820	28711	6,295,741
February-10	5984640	12432	29784	5,942,424
March-10	11787072	21973	62,273	11,702,826
Total	61460256	214913	257,331	60,988,012

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 $GEN_i * GEF$

Sr. No.	Month	Net Generation (EGy) (MWh)	Emission Factor (EFy) (tCO2/MWh)	Baseline emissions (BEy) (tCO2e)
1	October-09	18574	0.75	13930
2	November-09	10754	0.75	8065
3	December-09	7718	0.75	5788
4	January-10	6296	0.75	4721
5	February-10	5942	0.75	4456
6	March-10	11703	0.75	8777
	Total	60988	-	45737

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 emissions = 0

L_y = Leakages = 0

So $ER_y = BE_y$

Emission Reductions

Month	Emission Reductions, (tCO ₂ e)
October-09	13930
November-09	8065
December-09	5788
January-10	4721
February-10	4456
March-10	8777
Total	45737

Hence, total Emission Reductions of **45737 tCO₂e** are achieved by project activity from 01st October 2009 to 31st March 2010.

6. Outage Details

Month	Shutdown period (in hours)		Reason
	Unit 1	Unit 2	
September-09	-	-	No shutdown in this period
October-09	-	0:45	Grid fail
November-09	-	0:07	Grid fail
December-09	5:00	0:19	Grid fail
January-10	-	0:12	Grid fail
February-10	0:17	-	Grid fail
March-10	0:16	-	Grid fail

7. Meter Calibration

Location of installation	Make	Meter Serial No.	Calibration Valid from	Calibration Valid up to
Malana Generation Point	Secure Meter	KRB00280	24.07.2009	23.07.2010
	Secure Meter	KRB00282	27.07.2009	26.07.2010
	Secure Meter	AB0013A	09.04.2009	08.04.2010
	Secure Meter	AB0014A	09.04.2009	08.04.2010
Malana Transmission point (Sent Out)	Secure Meter	AB0001A	09.04.2009	08.04.2010
	Secure Meter	AB0002A	09.04.2009	08.04.2010
	Secure Meter	AB0003A	09.04.2009	08.04.2010
	Secure Meter	AB0004A ¹	09.04.2009	08.04.2010
	Secure Meter	AB0012A	06.10.2010	05.10.2011
Bajaura Substation Point	Secure Meter	AB0008A	16.07.2009	15.07.2010
	Secure Meter	AB0009A	16.07.2009	15.07.2010
	Secure Meter	AB0007A	12.06.2009	11.06.2010
	Secure Meter	AB0005A	24.07.2009	23.07.2010

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	272849
Actual VERs Reduction during the current monitoring period (Oct-09 to Mar-10)	45737
Actual VERs Reduction during the previous verification (Monitoring period Apr-09 to Sep-	181223

¹ AB0004A was replaced with AB0012A on 20.10.09

09)	
Actual VERs generated in a year (Apr-2009 to Mar-2010)	226960
Difference in estimated ERs in PD and actual generated ERs on Yearly basis	16.82% ²

² The actual emission reductions by the project activity in the year (Apr-09- Mar-10) is less than the estimated reductions claimed in the validated PD by 16.82% This is due to low PLF achieved in the year.

Annex-1

Monitoring details

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

The generation is recorded and monitored on a continuous basis. An hourly log is prepared by the shift in-charge. At the end of the day, hourly data is aggregated in a daily report. On a weekly basis Joint Meter Reading is taken by HPSEB personnel and a certificate of the same is provided by HPSEB.

The data on generation and export are regularly cross checked to check for any anomalies. Meters are calibrated annually to ensure the accuracy. Spare meter has been kept to replace with installed meters while doing calibration or failures of meters. Calibration certificates are kept in record to check the frequency of calibration of Meters.

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 particular 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:	60988

Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity meters are properly maintained with regular testing and 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	These meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department.
Any comment:	-

Annex -2

Contact details:

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Annex -3

Remainig findings/Issues from previous verifications

FAR was raised during the fourth verification. The explanation and the accounting of the same has been provided below:

FAR:

In the context of CAR IIⁱ, the continuous monitoring of the data with regard to the Toss HEP has to be ensured for the next verifications. Periodic calibration of the tri-vector meters at injection point of Toss hydro project has to be ensured for the next verifications.

Reply by PP:

The tri-vector meters at injection point of Toss hydro project would be calibrated annually and records of the same would be kept for future. Moreover the installed meters at Toss were calibrated at the time of installation and the calibration is valid for the monitoring period (01/04/2009 to 30/9/2009). Already the meters reading is being recorded and monitored on a continuous basis at Malana Yard(Sent out point)since beginning of operation. An hourly log is prepared by the shift incharge at both Toss and Malana. At the end of the day, hourly data is aggregated in a daily report

Accounting FAR in the current Monitoring period:

Calibration frequency of the energy meters has been maintained on annual basis by the PP and the calibration certificates have been made available to the DOE.

ⁱ Raised during the 4th verification; refer verification report number 8106120200-09/498V04 dated 7th December 2009