Vishnuprayag Hydro-electric Project (VHEP)
Monitoring report – VERs

1. Title of the project activity

Title: Vishnuprayag Hydro-electric Project (VHEP) by Jaiprakash Power Ventures Ltd. (JPVL)

Version: Ver 02

Date: 16/05/2007

2. Introduction

The purpose of this monitoring report is to calculate the Greenhouse Gas emission reduction achieved by the above mentioned project activity for the period starting from June 2006 to March 2007.

The monitoring report covers the activity from 03/06/2006[1] till 31/03/2007.

3. 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.

The project is a Renewable Energy project with maximum output capacity of 400 MW

Project Design Document: "**Vishnuprayag Hydro-electric Project (VHEP) by Jaiprakash Power Ventures Ltd. (JPVL)"**

Version: 1.0, Dated: 12/04/2007

4. Definitions in the report

PDD: Project Design Document

GHG: Greenhouse Gases

IPCC: Intergovernmental Panel on Climate Change

VER: Verified Emissions Reduction

5. General description of the project

[1] Date of synchronization of generation.

5.1. Project Activity

Vishnuprayag Hydroelectric Project (VHEP) is a 4 x 100 MW Run-of-the-River Project located across river Alaknanda near Joshimath in district Chamoli of Uttaranchal state of India which is being implemented by Jaiprakash Power Ventures Ltd. (JPVL), a subsidiary of Jaiprakash Associates Limited (JAL). The Project activity is located at a distance of about 525 km from New Delhi. JAL is a well-known business group of India and had entered into agreement with State Government of Uttaranchal, State government of Uttar Pradesh and Uttar Pradesh Power Corporation Limited (UPPCL)

VHEP shall have an underground power station with an installed capacity of 400 MW and shall utilize the water from river Alaknanda. The project is located at Rishikesh - Badrinath highway.

Project activity shall generate electricity using renewable hydel energy and sell it to UPPCL. JPVL has already been entered into Power Purchase Agreement (PPA) with UPPCL for this purpose. Although the project site is located in state of Uttaranchal, which was earlier, a part of Uttar Pradesh. So the PPA shall remain in principle with UPPCL, although project activity is supplying about 12% free electricity to Uttaranchal state as royalty. As the project activity involves generation of electricity by renewable sources of energy it will reduce anthropogenic Green House Gases (GHG) emissions that would have been generated to supply power to grid using fossil fuel. Here it is important to mention that at present more than 70% of power at the northern grid of India is obtained by fossil fuels.

Emergent Ventures India Pvt Ltd (EVI) is project advisor for the CDM project.

5.2. Technical description of the project

VHEP is a run of river scheme with no storage dam upstream and downstream. The project as envisaged comprises17m high diversion barrage across river Alaknanda, two intakes and two underground sedimentation chambers, 11.343 KM long head race tunnel, and underground power station and 1.92 KM long tail race tunnel and outfall works. The water would be delivered to the power house through a steel lined pressure shaft. A surge

shaft is constructed between the head race tunnel and the pressure shaft which would be used to regulate the flow.

The project activity utilizes Impulse type Pelton turbines. In an impulse turbine, the power is generated due to high velocity water stream striking the turbine blades, which are designed in the shape of cups. The cups move as a result of the impact in the same direction as the flow. The turbine shaft is coupled with the shaft of generator.

5.3. Contact Information

MC Maheswari
Director - Finance
Jaiprakash Power Ventures Limited (JPVL) (Also a project participant)
JA House 63,
Basant Lok, Vasant Vihar,
New Delhi - 110057
Contact Number: 91-11-26141540, 91-11-26151087 (Direct)

6. Monitoring methodology and plan:

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

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

- Net electricity supplied to the state grid by project activity.
- GEF (grid emission factor) of Northern grid, the grid to which project activity supplies power. The GEF is taken from available public source published by

Central Electricity Authority at http://www.cea.nic.in/planning/c%20and%20e/user%20guide%20ver1.1.pdf

7. Quality Control (QC) and Quality Assurance (QA)

Refer Annex-1

7.1. Calibration/Maintenance of Measuring and Analytical Instruments

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 UPPCL

7.2. Environmental Impact

There are no negative environmental impacts from the project activity.

8. GHG Calculations

8.1 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. Hence, no formulae are applicable.

8.2 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.

8.3 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.**

$$\mathbf{BE_y = EF_y \ X \ EG_y}$$

Where

BE_y: Baseline emissions due to displacement of electricity during year y in tons of CO_2

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

EF_y: CO_2 baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO_2/MWh.

Energy supplied to Grid

The energy supplied to grid is measured using electricity meters at the supply points. The net electricity supplied is measured as

EG_y = Total Generation – Auxiliary Consumption

Monthly power generation details are as follows (all figures in KWh else if mentioned)

Sr. No.	Month	Export	Import	Net Supplied to grid (2-3)	Adjustments (Infirm Energy Exports from Unit - II, metered at generator	Less - 12 % free power to government of Uttaranchal	Net Saleable
	1	2	3	4	5	6	7
1	Jun-06	34,737,059	-	34,737,059	4,529,780	3,624,873	26,582,406
2	Jul-06	87,738,094	-	87,738,094	5,741,076	9,839,642	72,157,376
3	Aug-06	132,658,049	-	132,658,049	6,050,000	15,192,966	111,415,083
4	Sep-06	217,316,147	-	217,316,147	598,456	26,006,123	190,711,568
5	Oct-06	179,254,366	-	179,254,366	2,450,401	21,216,476	155,587,489
6	Nov-06	89,250,819	-	89,250,819	-	10,710,098	78,540,721
7	Dec-06	69,814,475	-	69,814,475		8,377,737	61,436,738
8	Jan-07	58,181,760	-	58,181,760		6,981,811	51,199,949
9	Feb-07	45,501,772	-	45,501,772		5,460,213	40,041,559
10	Mar-07	56,469,034	3,636	56,465,398		6,776,284	49,689,114
	Total(MWh)	**970,922**	**3.6**	**970,918**	**19,369.713**	**114,186**	**837,362**

Column 4: Used for estimation of Emission Reductions

Column 6: Royalty provided to Uttaranchal Government

In the above table **column 4** gives the value of net electricity supplied by project activity to Grid

Grid Emission Factor

As discussed GEF is taken from available public source i.e. CEA published data.

http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

From above source we summarize that

Parameter	Value
OM	0.97
BM	0.53
CM	0.75

There for EF_y = 0.75 tCO_2/MWh

Baseline Emissions

Formula for Baseline emissions as discussed is GEN_i * GEF (for a particular year)

Month	Net Generation (KWh)	GEF	BEy
Jun-06	34,737,059	0.75	26,052.79
Jul-06	87,738,094	0.75	65,803.57
Aug-06	132,658,049	0.75	99,493.54
Sep-06	217,316,147	0.75	162,987.11
Oct-06	179,254,366	0.75	134,440.77
Nov-06	89,250,819	0.75	66,938.11
Dec-06	69,814,475	0.75	52,360.86
Jan-07	58,181,760	0.75	43,636.32
Feb-07	45,501,772	0.75	34,126.33
Mar-07	56,465,398	0.75	42,349.05
Total			**728,188**

8.4 Emission Reductions

$ER_y = BE_y – PE_y - L_y$

BEy = Baseline Emissions as calculated in Section 8.3

PEy = Project emissions = 0

Ly = Leakages = 0

So a total Emission Reduction of = **728,188 tCO_2** is achieved by Project activity from Jun 2006 to Mar 2007.

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 Grid Emission Factor for northern region grid.

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

Data / Parameter:	**$GEN_{i,y}$**
Data unit:	MWh
Description:	The units supplied by all WTGs to the NR grid during a particular year.
Source of data used:	Meters installed at the project site would accurately monitor electricity supplied to the grid. Invoice details of these sales to various customers could also be used for cross-checking the data.
Value applied:	Tabulated in Section 8.3
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 UPPCL.
QA / QC procedure applied	These meters are maintained by state electricity board and kept under lock. There is a provision of two transmission lines provided by UPPCL and both lines have one pair of main meter and check meter. These meters are regularly calibrated and the records maintained by state electricity department. The copies of calibration certificates have been provided. **Meter Details:** Accuracy of Meters: 0.2 CT Ratio: 1000/1A; PT Ratio: 400kV/110 v Multiplication Factor for KWh: 3636.36
Any comment:	

Data / Parameter:	GEF_y
Data unit:	tCO_2 equ/MWh
Description:	Emissions per MWh of energy supplied to grid by grid sources.
Source of data used:	CEA Website.

Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value used is from a published source i.e. Central Electricity Authority (CEA).
QA / QC procedure applied	-
Any comment:	-

Annex -2

Contact details:

MC Maheswari

Director - Finance

Jaiprakash Power Ventures Limited (JPVL) (Also a project participant)

JA House 63,

Basant Lok, Vasant Vihar,

New Delhi - 110057

Contact Number 91-11-26141540, 91-11-26151087 (Direct)