



**CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)**

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**SECTION A. General description of project activity.****A.1 Title of the project activity:**

Title : “86 MW Hydro Project in Himachal Pradesh”

Version: 2

Date : 25 Dec 2006

A.2 Description of the project activity:**Purpose of the Project:**

The purpose of the project activity is to generate electricity by using the renewable energy sources (water) for a grid system in the state of 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., a power trading and utility company owned by Government of India, under the power trading agreement. This electricity will be further delivered to HVPNL (Haryana Vidyut Prasara Nigam Limited and MPCL (Madhya Pradesh Power Corporation Ltd.).

The electricity generation facility is installed on Malana Nallah, a tributary of Parbati River. The project activity entails installation of two turbine of capacity 43MW each along with other auxiliary devices implemented at village Jari, Kullu District, Himachal Pradesh. The project activity has the capacity to generate about 370 million units per annum and this estimation is based on 95% power plant availability for a 90% dependable year based on the hydrological data for the last 24 years provided by the Government of Himachal Pradesh.

Profile of Project Promoter:

Malana Power Company Limited (MPCL) is the developer of the project activity, and has been promoted by LNJ Bhilwara group. Its flagship company, Rajasthan Spinning and Weaving Mills Limited (RSWM) is a leading textile mill in India for manufacture of polyester viscose yarn and fabric. The group has registered office in New Delhi. The group has business interest in textile; graphite electrodes oil exploration, sponge iron, financial services and exports. It has recently entered into power generation Sector.

The company has taken all the necessary approvals from Government of Himachal Pradesh (GoHP) for the installation, operation and maintenance of the project and sell the generated electricity.

Project Highlights:

- ♦ Run of the river power project with no water storage
- ♦ No major replacement & rehabilitation required for the project
- ♦ Strong sustainable development aspects of the project
- ♦ First Hydro Independent Power Producer (IPP) in HP, India
- ♦ First merchant power project in India
- ♦ Innovative design & creative scheduling. Reduction in scheduled completion time to 2.5 years from normally expected 5 years.



- ♦ Inter-state utilisation of power generated by a private company sale of energy directly to bulk users in another state.
- ♦ Out of eight projects allocated through MOU route by the Govt. of H.P, Malana is the only project to be completed before time.
- ♦ First hydro project in India to take hydrological Insurance cover

The Project activity contributes to the sustainable development of the region in the following ways:

➤ **Social well being:**

During the phase of construction, erection

The project activity has already and would in the future result in the enhancement employment of the local people during the construction and operation phases. It has already and would further help to enhance the skills of labour in the area by training

➤ **Economical well being:**

The project activity has already and would further create business opportunity for local stakeholders such as bankers, consultants, suppliers, manufacturers, shopkeepers, providers of transport facilities etc. Also it encourages other business groups to invest in the region by setting its own example.

➤ **Environmental well being**

The project will generate clean and green power and supply to the northern region grid. This will lead to reduction in GHG emission due to the fossil fuel usage in the grid connected power plants. Also the project activity is a step towards environmental sustainability by saving exploitation and depletion of natural, finite and non renewable resources like coal/gas. Further as it is a run-of-the river project there is no shortage of land, hence no loss of species.

Hence the project does not cause any resettlement or rehabilitation of the people

➤ **Technological well beings**

The project activity helps turbine manufacturer to develop more efficient turbine system for electricity generation. It will also help to develop new electricity transmission equipments to reduce transmission losses.

A.3. Project participants:

Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (yes/no)
Government of India (Host Party)	Malana Power Corporation Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

**A.4.1.1. Host Party(ies):**

India

A.4.1.2. Region/State/Province etc.:

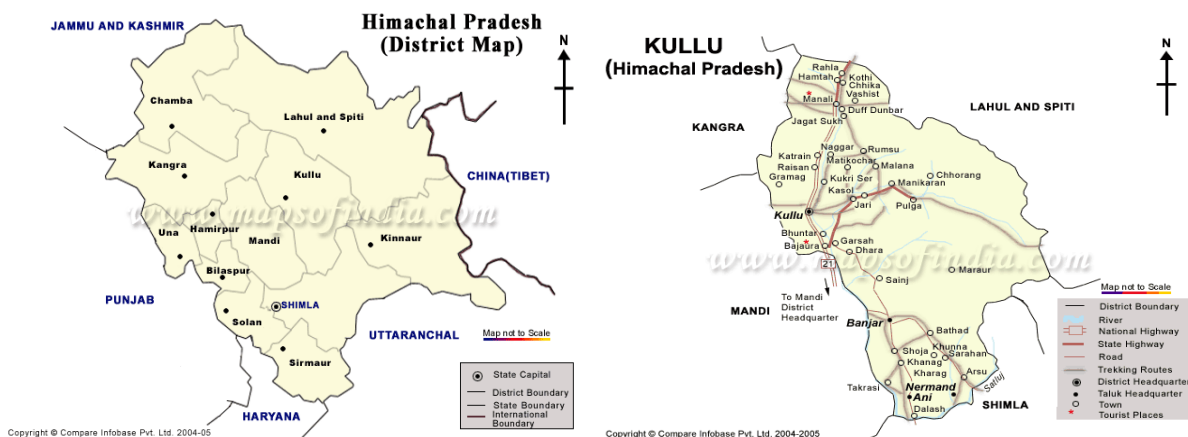
Himachal Pradesh

A.4.1.3. City/Town/Community etc:

Village: Jari
District: Kullu

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project is located at Jari village in district Kullu of Himachal Pradesh around 25 Km from Bhunter. The Project activity is uniquely identified as Malana Hydro Project in the region. The nearest railway station from the project site is Kiratpur Sahib, about 198 Km from Bhunter. Bhunter has airport and is well connected to Delhi.

**A.4.2. Category(ies) of project activity:**

The project is a run-of-river hydro power project and categorized in Scope Number 1; Sectoral Scope-Energy industries (renewable/non-renewable sources).

A.4.3. Technology to be employed by the project activity:

The project is a grid connected hydel power plan which is run of the river with a small reservoir. It involved construction of a barrage across Malana Nallah 3 Km downstream of Malana village, a head regulator, a desilting basin storage reservoir to divert water draft of 21cumecs through a 2.8 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 housed in a surface powerhouse. The plant will be generating 370 GWh of energy annually. It will provide a peaking capacity benefit for four hours per day year round for a minimum of 86 MW.

The project consisting of a barrage comprising 3 spillway bays each in the right flank of Malana Nallah to pass 50 year design flood of 614 cumecs at maximum / normal pond level. The head regulator is located on the left bank of Malana Nallah upstream of barrage to divert maximum flow of 26.25 cumecs which includes 25% flushing discharge for the de-silting basin. Three bays have been provided in the head regulator. The de-silting basin has been designed to remove all the silts particles up to 0.2 mm size. A diversion channel is provided downstream of barrage structure to carry the design flood of 614 cumecs. Storage reservoir has the storage capacity of 24.9 ha.m to meet the peaking power requirements. The power release would be diverted into the headrace tunnel through an intake structure located at downstream end of the reservoir. The intake at entry has been provided with a smooth transition to D-shaped headrace tunnel. A trapezoidal shaped trash back structure is provided in front of intake to trap and impede passage of floating debris.

The water discharged is channeled through a 2.85 m wide D- shaped pressure tunnel or head race tunnel which is 2800 m long. At the end of headrace tunnel, a surge shaft has been provided which is 72 m high and has an orifice diameter of 1.4 m to certain the height of surges.

A vertical pressure shaft of 2.5 m diameter followed by a steel lined horizontal pressure tunnel of 2.2 m diameter which runs down the hill slope and bifurcates into two branches of 1.5 m diameter each to feed the two vertical axis type Pelton units. To exploit the net head of 480 meters, a power house has been created with two units of 43 MW each and is also housing the step-up transformer. A 132 KV transmission line then evacuates the power to a place called Sarabhai, approx. 25 km away from the plant and feeds it into the HPSEB network.

Technical Highlights of Project:

- | | |
|-------------------------------|--------------------------|
| 1. Capacity of Reservoir | : 2,35,000 cubic meter |
| 2. Diameter of Penstock | : 2.2 meter |
| 3. Design Discharge | : 21 cubic meter/ second |
| 4. Number of Head race tunnel | : One 3280 meter Long |

Power House Complex

- | | |
|------------------------|--------------------------|
| 1. Installed Capacity | : 86 Mw |
| 2. Size of Power House | : 55m X 18.7m X 28.9 m |
| 3. Type of Turbines | : Pelton , Vertical Axis |
| 4. Generating Units | : 2 Units of 43 MW each |
| 5. Maximum Gross Head | : 505 m |

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The project activity is a run-of-river with no project emissions associated with its operations. In the absence of the project activity, same amount of power would have been generated using fossil fuels as in



the case of current grid generation mix, which is dominated by rather inefficient coal-fired power plants¹. The project activity thus avoids power generation using fossil fuels and reduces associated GHG emissions.

The project activity faced various barriers for implementation. Without carbon credits benefits it would have not been possible to implement the project.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO ₂ e
July 2001-Dec 2001	122509
Jan 2002- Dec 2002	251865
Jan 2003 Dec 2003	258358
Jan 2004 Dec 2004	198804
Jan 2005 Dec 2005	267879
Jan 2006 Dec 2006	273849
Jan 2007 Dec 2007	273849
Jan 2008 Dec 2008	273849
Jan 2009 Dec 2009	273849
Jan 2010 Dec 2010	273849

A.4.5. Public funding of the project activity:

No public funding has been received for the project activity.

SECTION B. Application of a baseline methodology.

B.1. Title and reference of the approved baseline methodology applied to the project activity:

Title: “Consolidated baseline methodology for grid connected electricity generation from renewable sources”

Reference: Approved consolidated baseline methodology ACM0002/Version 06, Sectoral Scope: 01, Date 19 May 2006

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

The position of the CDM project activity vis-à-vis applicability conditions in the ACM0002/Version06 is described in the following table.

Applicability Conditions in the	Position of the project activity vis-à-vis
---------------------------------	--

¹ Current generation mix provided in annex-3



ACM0002/Version06	applicability conditions
Applies to electricity capacity additions from: Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased.	The project activity is a grid connected run-of-the-river hydro power project
This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;	It is a renewable energy project with no fuel-switch involved.
The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available; and	The project activity supplies power to NR Grid which in turn caters to electricity demand in various states in North India. The NR Grid encompasses all power plants supplying power through the grid to the states of Delhi, Haryana, HP, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, and Union Territory of Chandigarh. Adequate data is available to estimate grid emission factor. GEF calculation is available in public domain and is done by central agency viz. Central Electricity Authority.

B.2. Description of how the methodology is applied in the context of the project activity:

The project activity uses the approach described in the ACM0002/Version06- “**Consolidated baseline methodology for grid-connected electricity generation from renewable sources**”

The baseline establishment is based on published data on Central Electricity Authority (CEA). The following are the basic attributes of the calculation procedure followed for calculation of GEF.

- GEF calculation is based on baseline methodology ACM0002 version 6 and is publically available on CEA website. <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>
- CEA being a central authority, undertaking of Indian government, has all the first hand information availability for calculation of GEF.
- All the assumptions and calculation models are explained in user guide for the ease of CDM applicants. <http://cea.nic.in/planning/c%20and%20e/user%20guide%20ver1.1.pdf>

Based on Published data

Parameter	Value
OM	0.97
BM	0.53
CM	0.75



Combined Margin for Northern Grid is **0.75t CO₂/MWh**

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

The project proponents have used VCS to analyze the additionality argument vis-à-vis project activity.

The VCU (Voluntary Carbon Units) criteria require that project from which emission reductions are created pass an additionality test. Through the additionality test the project proponent shall show that mitigation measures result in real reduction in greenhouse gases against a transparent emission baseline. Project additionality shall be done based on one of the criteria prescribed in VCS. The following logic has been used by project proponents:

The project has selected the appropriate baseline and its project emissions are found to be below the selected baseline. In order to determine the baseline the project will use either of the following criteria

- *Determine the baseline based on existing or historical emissions*
- *Determine the baseline based on its industry benchmark under similar social, economic, environmental and technological circumstances*
- *Determine the baseline by identifying the most likely new project activity providing the same level of services as the proposed project*

The Project activity is a run-of-the-river hydel project which will supply power through the NR Grid. The power generated by the project activity displaces the power that would have otherwise been generated using fossil-fuel as in the current supply mix of the grid. NR grid is operating with a mix of hydro, nuclear (Total 28%) and fossil fuel (Total 72%) power plants.

The GEF as discussed in section B.2 is taken from publically available source and is based on historical data of power plant performances. CEA has access to all the required data and has done the calculation in a transparent and conservative manner based on guidelines as per ACM0002.

This clearly demonstrates that baseline has been determined based on genuine historical data and project activity being a renewable source power shall add to greenhouse gas reductions in real sense.

In addition project activity is in compliance with applicable laws and regulations.

Common Practice analysis:

The project activity is the first hydro Independent Power Producers (IPPs) in Himachal Pradesh, India. It is also the first Merchant power plant in the country. An analysis of total power generated in northern region shows that there are not many large scale hydro power projects promoted by private players, hence it is one of its kind in the region

There is minimal private sector participation in hydro power generation in India. Nearly 98% of installed capacity is with Government owned utilities. Lack of private sector participation in hydro power sector is due to difficulties in arranging finance for the projects. Further, most hydro projects in India have run up high capital costs, faced considerable implementation delays, run into geological related problems and faced significant rehabilitation & resettlement related problems, which have contributed to the high



financial risk now associated with hydropower projects. In addition, private power generation in India has a chequered past, since state utilities are the usual off takers and the financial standing of most state owned utilities is in a perilous state. Given this background, most private investors are wary of venturing into hydro power development in India.

Fossil fuel based power plant have been considered most popular power generation alternatives in India since they give high return on investment and availability of easy project finance. Installed capacity of fossil fuel based thermal power plants are increasing year by year very rapidly. The encouraged development of thermal power project is illustrated through a consideration of five-year plans over the last 50 years (as shown below in the table). Five year plans are developed by the Planning Commission to identify the planned capacity addition to the national and regional grid.

<i>Plan and Year</i>	<i>Hydro (%)</i>	<i>Thermal (%)</i>	<i>Nuclear and Wind (%)</i>
1 st Plan 1956	35	65	0
3 rd Plan 1966	46	54	0
5 th Plan 1979	41	57	2
7 th Plan 1990	29	69	2
9 th Plan 2002	25	71	4

Data Source: <http://powermin.nic.in> (see Plan to augment power generation; Accelerating the Development of hydro projects)

Project activity is the first large scale hydro project in state and an example for the other project developers in the state. It is also first IPP (Independent Power Producer) in India.

The above analysis clearly and strongly demonstrates that project activity has led to greenhouse gas reduction over an above a transparent and conservative baseline.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The project boundary covers the point of water supply (Penstock entry) to the point of power generation and export to the grid. Thus project boundary covers the intake water structures, turbine, generator, control system, auxiliary units, synchroniser and the power evacuation system.

According to the approved consolidated baseline methodology ACM0002 the spatial extent of the project boundary includes the project site and all the power plants connected physically to the electricity system that the CDM project power plant is connected to.

For the purpose of determining Operating Margin (OM) and Build Margin (BM) emission factor, a (regional) project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints.

The project activity evacuates the power to the northern grid therefore all the power plants contributing to the northern regional grid are taken for the calculation of base line.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:



The baseline was completed by Emergent Ventures India Pvt. Ltd. The person who identified the baseline is not the project participant and not listed in the Annex-1.

Ashutosh Pandey

Emergent Ventures India Pvt. Ltd. (Project Advisor)

II C-141, Ridgewood Estate, DLF Phase-IV

Gurgaon, Haryana, India-122002

Tel (Fax) : +91 124 5102980
Mobile : +91 93125 47154
E-mail : ashutosh@emergent-ventures.com

**SECTION C. Duration of the project activity / Crediting period****C.1 Duration of the project activity:****C.1.1. Starting date of the project activity:**

05 July 2001

C.1.2. Expected operational lifetime of the project activity:

40 Years

C.2 Choice of the crediting period and related information:**C.2.1. Renewable crediting period***Not applicable***C.2.1.1. Starting date of the first crediting period:****C.2.1.2. Length of the first crediting period:****C.2.2. Fixed crediting period:****C.2.2.1. Starting date:**

05/07/01

C.2.2.2. Length:

10 Years

SECTION D. Application of a monitoring methodology and plan**D.1. Name and reference of approved monitoring methodology applied to the project activity:**

Methodology: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”

Reference: Approved consolidated monitoring methodology ACM0002/Version 06, Sectoral Scope: 1,
Date: 19 May 2006

**D.2. Justification of the choice of the methodology and why it is applicable to the project activity:**

The applicability criteria of approved consolidated monitoring methodology ACM0002 and the explanation of how the project activity will meet the criteria are discussed below

- ❖ Applies Electricity capacity addition from
 - Run of – river hydro power plant; hydro power projects with existing reservoir where the volume of the reservoir is not increased;
 - Wind sources;
 - Geothermal sources;
 - Wave and tidal sources;

The project activity is a run of river hydro power plant and hence meets the above criteria

- ❖ The methodology is not applicable to project activity that involves switching from fossil fuel to renewable energy at the site of project activity, since in this case baseline may be the continued use of fossil fuel at the project site;

In this project activity there is no fossil fuel switch at the project site

- ❖ The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;

**D.2.1.1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario**

Project emissions will be considered zero as per methodology, so no variable is required for section D.2.1.1.

D.2.1.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

>>

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.



1	EGy : Delivered electricity to the grid generated by project activity	MPCL records/ Invoice records	MWh	Hourly measurement and monthly recording	100%	Electronic	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.
2	EF _y : CO2 emission factor of the grid	CEA	iCO ₂ /MWh	Once at the time of submission of PDD	100%	Electronic	Calculated as weighted sum of OM and BM emission factors

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

Calculation of baseline emission factor

The baseline emission factor (EF_y) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three steps. Calculations for this combined margin are based on data from an official source.

STEP 1: Calculate the Operating Margin emission factor

Simple OM approach is the most appropriate calculations method because in the NR grid mix, the low-cost/must run resources constitutes less than 50% of total grid generation. Simple OM factor is calculated as under.

$EF_{OM, simple, y}$ is calculated as 3-year average (2002-03, 2003-04, 2004-05), based on the most recent statistics available at the time of PDD submission,



$$EF_{OM, simple, y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_j GEN_{j,y}}$$

Where

$GEN_{j,y}$:

The electricity (MWh) delivered to the grid by source j

$COEF_{i,j,y}$:

The CO₂ emission coefficient of fuel i (t CO₂ / mass or volume unit of the fuel), calculated as described below and

$F_{i,j,y}$:

The amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y, calculated as described below

J, Refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports from the grid

The CO₂ emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \otimes EF_{CO2,i} \otimes OXID_i$$

Where

NCV_i :

The net calorific value (energy content) per mass or volume unit of a fuel i

$EF_{CO2,i}$:

The CO₂ emission factor per unit of energy of the fuel i (IPCC default value)

$OXID_i$:

The oxidation factor of the fuel (IPCC default value)

The amount of fuel $F_{i,j,y}$ is obtained as

$$F_{i,j,y} = GGEN_{j,y} * DSHR_y \div NCV_i$$

where:

$GGEN_{j,y}$ = Gross Power Generation from the power source j in the year y (MWh)

$DSHR_{j,y}$ = Design Heat Rate of the power source j in the year y

NCV_i = Net calorific value per mass or volume unit of a fuel i



For most of the power plants design heat rate is taken wherever information is available. For other plants regional average regional design heat rate is taken.

STEP 2: Calculate the Build Margin emission factor ($EF_{BM,y}$) as the generation-weighted average emission factor (t CO₂/MWh) of a sample of power plants m of NR grid, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_m GEN_{m,y}}$$

Where

$F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ - Are analogous to the variables described for the simple OM method above for plants m.

Calculation of the Build Margin emission factor $EF_{BM,y}$ ex-ante are based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently (This sample group is larger than group consisting of the five power plants that have been built most recently)

Further, power plant capacity additions registered as CDM project activities have been excluded from the sample group m of NR grid mix.

STEP 3: Calculate the baseline emission factor EF_y as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = W_{OM} \otimes EF_{OM,y} \oplus W_{BM} \otimes EF_{BM,y}$$

where the weights w_{OM} and w_{BM} , by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,Simple,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in t CO₂/MWh.

Calculation of Baseline Emissions

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.



$$BE_y = EF_y \times EG_y$$

Where

BE_y : Baseline emissions due to displacement of electricity during the 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.

For this methodology, it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity. They are therefore neglected.

The above method is used in CEA published data, which has been used to calculate Emission Reductions for this project activity.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not Applicable

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Not Applicable

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

**D.2.3. Treatment of leakage in the monitoring plan****D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity**

ID number (Please use numbers to ease cross- referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not Applicable

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

There are no emission sources as leakage in the project activity. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction. However according to ACM0002 Project participants do not need to consider these emission sources as leakage in applying this methodology.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

Formula used for estimation of the total net emission reductions due to the project activity during a given year y is as under.

$$ER_y = BE_y - PE_y - L_y$$

Where

ER_y : Emissions reductions of the project activity during the year y in tons of CO₂
 BE_y : Baseline emissions due to displacement of electricity during the year y in tons of CO₂

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.



PE_y : The project emissions associated with the project activity (none for the project activity)
L_y : The emissions sources as leakage (none for the project activity)

hence PE_y = 0
And L_y = 0

So the above equation reduces to
ER_y = BE_y

**D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored**

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1. EG _y - Electricity supplied to the grid by the project activity	Low	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.
2,	Low	This is calculated based on the formula described in ACM0002, as per CEA data.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

A system to maintain records of power production, supply to grid, auxiliary consumption is already in place and shall take care of monitoring requirements for project activity. People will be explained about CDM concept and monitoring plan. The data shall be properly archived for any kind of check at a later date. The cumulative weekly and monthly reports shall be checked for any kind of aberrant figures and trends. In case of any irregularity observed, it is informed to the concerned person for necessary actions. On monthly basis, these reports are forwarded at the management level. Detailed monitoring plan attached in Annex-4.

D.5 Name of person/entity determining the monitoring methodology:

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

SECTION E. Estimation of GHG emissions by sources**E.1. Estimate of GHG emissions by sources:**

There are no project emissions in the project activity. P_{Ey} = 0

**E.2. Estimated leakage:**

According to Approved consolidated monitoring methodology ACM0002/Version 06 there will be no leakage during the implementation and operation of the entire project activity.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

Total project activity emissions are zero over entire crediting period.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

SN	Operating Years	Baseline Emission Factor (tCO ₂ / GWh)	Baseline Emissions (tCO ₂)
1.	July 2001-Dec 2001	750	122509
2.	Jan 2002- Dec 2002	750	251865
3.	Jan 2003 Dec 2003	750	258358
4.	Jan 2004 Dec 2004	750	198804
5.	Jan 2005 Dec 2005	750	267879
6.	Jan 2006 Dec 2006	750	273849
7.	Jan 2007 Dec 2007	750	273849
8.	Jan 2008 Dec 2008	750	273849
9.	Jan 2009 Dec 2009	750	273849
10.	Jan 2010 Dec 2010	750	273849

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

SN	Operating Years	Baseline Emissions (tCO ₂)	Project Emissions (tCO ₂)	CO ₂ Emission Reductions (tCO ₂)
1.	July 2001-Dec 2001	122509	0	122509
2.	Jan 2002- Dec 2002	251865	0	251865
3.	Jan 2003 Dec 2003	258358	0	258358
4.	Jan 2004 Dec 2004	198804	0	198804
5.	Jan 2005 Dec 2005	267879	0	267879
6.	Jan 2006 Dec 2006	273849	0	273849
7.	Jan 2007 Dec 2007	273849	0	273849
8.	Jan 2008 Dec 2008	273849	0	273849
9.	Jan 2009 Dec 2009	273849	0	273849



SN	Operating Years	Baseline Emissions (tCO ₂)	Project Emissions (tCO ₂)	CO ₂ Emission Reductions (tCO ₂)
10.	Jan 2010 Dec 2010	273849	0	273849

E.6. Table providing values obtained when applying formulae above:

SN	Operating Years	Baseline Emissions (tCO ₂)	Project Emissions (tCO ₂)	Leakages (tCO ₂)	CO ₂ Emission Reductions (tCO ₂)
1.	July 2001-Dec 2001	122509	0	0	122509
2.	Jan 2002- Dec 2002	251865	0	0	251865
3.	Jan 2003 Dec 2003	258358	0	0	258358
4.	Jan 2004 Dec 2004	198804	0	0	198804
5.	Jan 2005 Dec 2005	267879	0	0	267879
6.	Jan 2006 Dec 2006	273849	0	0	273849
7.	Jan 2007 Dec 2007	273849	0	0	273849
8.	Jan 2008 Dec 2008	273849	0	0	273849
9.	Jan 2009 Dec 2009	273849	0	0	273849
10.	Jan 2010 Dec 2010	273849	0	0	273849

**SECTION F. Environmental impacts****F.1. Documentation on the analysis of the environmental impacts, including trans boundary impacts:**

For a hydroelectric power project the major concern is at the point of project implementation in regard to social, economic and environmental issues. Under the regulatory frame work, Environment Impact Assessment (EIA) study is mandatory for the project activity as clarified by the Host party namely Ministry of Environment and Forests, Government of India. In this regard MPCL has addressed and resolve the key issues which are necessary part of Environment Impact Assessment. The environmental impacts associated with the project activity are as follows:

Impact on Flora and Fauna

Project activity don not involve storage of large amount of river water hence there is no issue regards to the submergence of the forests, fertile land or of the inhabited areas. The structure of project (including reservoir, barrage and other facilities) is not very big in size to cause any significant disturbance to the eco-system. No significant deforestation is required at the weir side location. Implementation of the scheme would help in conservation of forest by replacing the firewood for cooking and heating purposes with electricity.

Socio-Economic Impact

There is no rehabilitation and resettlement has been taken place by the project activity. No relocation of the human population occurred around the project activity. Project activity acquires small pieces of land for which adequate compensation was paid to the local villages; this compensation would help the local population to start new business in the nearby area.

15% of the generated electricity is being delivered to the state grid as royalty which will improve the power scene in the nearby area.

Environment Pollution

Since it is hydro project so there is no issue regarding air pollution. On the other hand power generation from the project will result in air quality improvement and emission reductions caused by burning of fossil fuels and firewood.

Impact of Noise Quality

Equipments which are being used in project activity has the ability to keep the noise level below 90 db for an exposure time of 8 hours as enforced by OSHA (Occupational Safety and Health Administration). During the construction phase, the personnel operating and stationed near the Heavy Earth Moving Vehicles and Concrete Mixing Machines provided with adequate Personal Protective Equipment (PPEs) to avoid damage to the health. The noise generated in the construction process did not have any significant impact on the ambient noise levels. Hence there is no significant noise impact has been observed.



F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The MPCL is an environmentally benign ‘clean energy’ and cost effective solution to meet the region’s growing energy demands. Efforts have been made to enhance the existing resources and minimize the adverse impact on the ecosystem through suitable planning. Environmental Impact Assessment for the project has been carried out and the clearance for the project has been obtained.

SECTION G. Stakeholders’ comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

MPCL identified the people, groups and organisations that were interested or have got involved with this project implementation as stakeholder. MPCL sent a communication to all the identified stakeholders about the project activity. They conducted open consultation where all the stakeholders were given an opportunity to present their views and opinions regarding the MPCL project. All these communication process were aimed at

- ❖ Transparency
- ❖ Accountability
- ❖ Flexibility
- ❖ Increased stakeholder awareness of project related issues
- ❖ Broad stakeholder input and involvement
- ❖ Efficiency and effectiveness
- ❖ Promotion of stakeholder confidence
- ❖ Understanding of stakeholder perspective

The following are the identified stakeholders for the project activity

1. Government Parties

- ❖ HPEB (Himachal Pradesh Electricity Board)
- ❖ Pollution Control Board of Himachal Pradesh & Environmental Department of Himachal Pradesh
- ❖ Ground Water Department
- ❖ MNES (Ministry of Non Conventional Energy Sources)

2. Non- Government Parties

- ❖ Gram Panchayat of Jari Village
- ❖ Land Owner
- ❖ Non-Government Organisation(NGOs)
- ❖ Consultants
- ❖ Equipment suppliers

Stakeholder list includes various government and non-government parties, which are involved with the Project activity at various stages of its implementation.

G.2. Summary of the comments received:

**Government Parties****Himachal Pradesh State Electricity Board (HPSEB)**

As an importer of the power, the HPSEB is a major stakeholder in the MPCL project activity. They hold the key to the commercial success of the MPCL project. HPSEB has already cleared the MPCL project and MPCL signed Power Purchase Agreement (PPA) with HPSEB.

Himachal Pradesh Pollution Control Board (HPPCB), Environment Department of Himachal Pradesh

Himachal Pradesh Pollution Control Board (HPPCB) and Environmental Department of Government of Himachal Pradesh have prescribed standards of environmental compliance and monitor the adherence to the standards. The MPCL project received NO Objection Certificate (NOC) from Himachal Pradesh Pollution Control Board for commissioning of the project. Project proponent has also taken consent from Environmental Department of Himachal Pradesh.

Ministry of Non Conventional Sources and Ground Water Department

Ministry of Non Conventional Sources, Government of India has been promoting the energy renewable project such as wind, solar, hydro, mini hydro, biomass based projects to conserve available sources (such as fossil fuel, diesel and natural gas) for future uses. Effort implementing this hydro project was appreciated by the MNES.

Consent of Ground water department is mandatory in the implementation of the hydro projects, since this project does not affect the quality and quantity of the ground water in the region, so project activity has been given the approval to implement and operate the hydro power plant in the region

Non-government parties**Village panchayat and Local Populace**

The village Panchayat / local elected body of representative administering the local area are a true representative of local population in a democracy like India. Hence, their consent / permissions to set this project were necessary. MPCL has completed the necessary consultation and documented their approval for this project.

Local population comprises of the local people in and around the MPCL project area. The roles of the local people are as a beneficiary of the MPCL project. The construction of MPCL project and continuous operation included local manpower working at the same plant site. Since, the MPCL project provided good direct and indirect employment opportunities the local populace is encouraging and providing complete support to the MPCL project.

The MPCL project does not require any major displacement of local population. The Project activity has acquired land from local population and local population have been given compensation for this thing. So project activity has not received any adverse comment from their side.

Non-Government Organisations (NGOs), Consultants, Equipment Suppliers

The NGOs got involved with the MPCL project during various stages of its implementation. They have provided complete support to the MPCL project activity.

Project consultants were involved in the MPCL project to take care of various pre contracts and post contract project related activities like preparation of detailed project report (DPR), preparation of basic



and detailed engineering documents, preparation of tender documents, selection of vendors / suppliers, supervision of project implementation, successful commissioning and trial runs. Equipment supplier delivered all the equipment as per specification within the schedule and MPCL successfully commissioned the plant.

Land Owner

Project activity acquired land from few local land owners. Acquisition process has been done after taking consent of the land owners and land owners have been compensated for losing their land by the project activity. Land owners have not shown any adverse reply against this process.

G.3. Report on how due account was taken of any comments received:

During the consultation process with stakeholders it is found that there is no major issue which would affect the life of local community or raise any environmental related problem in the region by implementation of the project activity. All the minor comments and concerns were properly addressed to the satisfaction of the stakeholder by the project proponent during the public hearing meeting.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY***Project Participant*

Organization:	Malana Power Company Limited (MPCL)
Street/P.O.Box:	Sector-1
Building:	Bhilwara Towers, A-12
City:	Noida
State/Region:	Uttar Pradesh
Postfix/ZIP:	201301
Country:	India
Telephone:	+91-120-2541810
FAX:	+91-120-2531648
E-Mail:	opajmera@lnjbhilwara.com
URL:	www.lnjbhilwara.com
Represented by:	
Title:	Vice President & CFO
Salutation:	Mr.
Last Name:	Ajmera
Middle Name:	P.
First Name:	O.
Department:	Finance
Mobile:	+91-98100 72650
Direct FAX:	+91-120-2531745
Direct tel:	+91-120-2536784
Personal E-Mail:	opajmera@lnjbhilwara.com



Annex-2
INFORMATION ABOUT PUBLIC FUNDING

The project proponents have availed no public funding for the project activity.

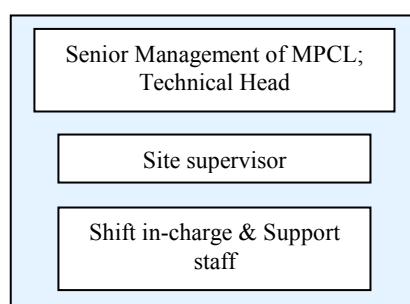


Annex – 3
BASELINE INFORMATION

Refer to section B.2 for information on baseline of project activity.

**Annex 4****MONITORING PLAN****Project Management Plan:**

A team would be constituted with participation from relevant departments. People will be trained on CDM concept and monitoring plan. This team will be responsible for data collection and archiving. This team will meet periodically to review CDM project activity check data collected, emissions reduced etc. On a weekly basis, the monitoring reports will be checked and discussed by the seniors and team members/managers. In case of any irregularity observed, it shall be informed to the concerned person for necessary actions. On monthly basis, these reports shall be forwarded at the management level.



Senior Management of MPCL/Technical Head: Overall responsibility of compliance with the CDM monitoring plan.

Site Supervisor: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation

Shift In-charge: Responsibility of daily report generation

Data Monitoring:

The methodology requires monitoring of the following:

- Electricity generation from the project activity;

Completeness-

For Electricity generation data: The project activity will install the latest state-of-art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Real time data collection will happen using these control systems. An hourly log of data will also be prepared by the shift in-charge. A daily report of aggregation of these data will also be prepared. Parameters monitored are the total power generated, power exported to the grid and auxiliary power consumed (other parameters like head availability, grid issues, frequency etc will also be maintained hourly in the log).

For data requirement to calculate OM & BM: NREB/NRLDC publishes yearly reports regarding the performance of the power plants attached to the NR grid. Apart from these reports, CEA and MOP also publish yearly power plants performance data.

***Reliability-***

For electricity generation data: automatic control meters for power generation and exports will be regularly maintained. The regular plant operating & maintenance procedures will also include process of regular meter testing, calibration & maintenance. All these meters will be calibrated & tested before installation and after every six months from commissioning. *The calibration of meters is done at Government of India Lab every six months.*

Actual power generation data will also be metered using power output meter at the substation. The billing invoices for the power sold and meter readings could be used to validate the data accuracy.

Frequency-

The measurement 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. Project shall be provided with time of day metering with 15-minute time stamping of all parameters including energy. The meters to be provided shall be of 0.2 accuracy class.

Training-

Training needs have been identified in project document; however the group is already operating a plant in Manikaran valley & experienced staff will be available for plant O&M.

Report generation on monitoring-

After verification of the data and due diligence on corrective ness if required an annual report on monitoring and estimations shall be maintained and record to this effect shall be maintained for verification.

Internal audits of CDM project compliance-

CDM audits shall be carried out to check the correctness of procedures and data monitored by the internal auditing team entrusted for the work. Report on internal audits done, faults found and corrective action taken shall be maintained and kept for external auditing.

Sustainable Development Indicator(SDI) Monitoring-

Project has a detailed Environment Management plan; SDI will be monitored as per plan.