**PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Small Hydro Power Project in Chamba, Himachal Pradesh
Version number of the PDD	04
Completion date of the PDD	28/12/2012
Project participant(s)	Batot Hydro Power Limited
Host Party(ies)	India
Sectoral scope(s) and selected methodology(ies)	**Type : I –** Renewable Energy Projects **Category : D –** Electricity generation for a system **Sectoral Scope : 1 –** Energy industries (renewable / non renewable sources) **Methodology:** **Title:** Grid connected renewable energy generation **Reference:** AMS I.D. (Version 17, EB 61)
Estimated amount of annual average GHG emission reductions	11,954 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Purpose of the project activity:

Batot Hydro Power Limited (BHPL) is implementing the Small Hydro Electric Project of 3.5 MW capacity allotted by HIMURJA, a nodal agency for development of hydropower in Himachal Pradesh. BHPL is developing the project across Balij ka Nala, a tributary of River Ravi in District Chamba. The project comprises of 2 units of 1.75 MW each. The power thus generated is planned to be sold to NEWNE[1] grid.

PP has proposed to install a unit of 3.5 MW with following structures and facilities:

- Boulder Weir with side intake, Bottom outlet and Fish ladder
- Approach channel and Desilting basin
- Cut and Cover section
- Power tunnel
- Restricted Orifice type Surge Shaft
- Steel Penstock Bifurcating into two branches to lead discharge into two turbines
- Power house: surface type, housing 2 turbines of 1.75 MW
- Tail race for letting out the discharge back to Balij ka Nala via RCC duct
- Switchyard for evacuation of power at 33 kV to nearest HPSEB[2] substation of Jarangla.

Power house for the Balij ka Nala small hydro power project is proposed on the right bank of Balij ka Nala near village Kawari.

The project activity will displace the electricity that would have been generated from the fossil fuel based power generators connected to the local grid.

The project activity is expected to generate average GHG emission reduction of 11,954 tCO_2e per annum. The average lifetime of the project as per the implementation agreement signed with Government of Himachal Pradesh is 40 years. Most of equipment may have to be replaced or refurbished before 40 years. Hence, PP has not mentioned life periods of individual equipment.

The project proponent has developed this project keeping in consideration of the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. The project activity is also responsible for sustainable economic growth and conservation of environment.

Baseline Scenario (Similar to the scenario existing prior to the prior to implementation of project activity):

In absence of the project activity, the NEWNE Grid would have procured the electricity generated from fossil fuel based power projects. The project activity would contribute in reducing emission of GHGs. Further, the generation of energy from hydel power would replace the energy generation from fossil fuels and reduce the usage of fossil fuels. This would in turn contribute to the global as well as national energy security.

[1] NEWNE- Northern Eastern Western and North-Eastern
[2] HPSEB – Himachal Pradesh State Electricity Board

The development of the project activity is reducing and would reduce the Green House Gas (GHG) emissions produced by the NEWNE grid generation mix, which is mainly dominated by fossil fuel based power

Contribution to the sustainable development:
The project activity will contribute to the sustainable development through:

Social well being
- Since, the project activity is in a rural area, it will aid in the development of the region.
- The project activity will help in reducing migration of rural population to urban areas.
- The project activity will result in generation of direct and indirect employment opportunities for the local people, both during construction and operation phases.

Economic well being
- The project has created a business opportunity for local stakeholders such as suppliers, manufacturers, contractors etc.
- The project will aid in reducing the power deficit in the country.

Environmental well being
- Since, the project uses renewable hydro resources for power generation; it does not lead to any green house gas emission.
- Avoidance of fossil fuel consumption results in SO_x, NO_x and particulate matter emission reduction.
- The project activity is a step towards environmental sustainability by saving exploitation and depletion of a natural, finite and non-renewable resource like coal/gas.

Technological well being
- The technology leads to utilization of environmentally safe and sound technologies in small-scale hydro power sector.
- The project demonstrates harnessing small hydro potential in the region and encourages setting up such projects in near future.

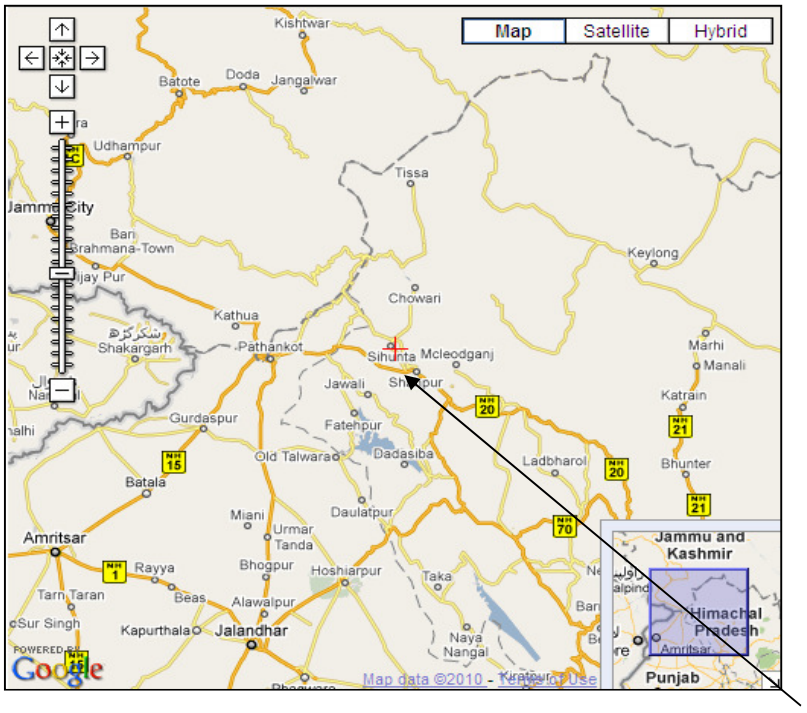
A.2. Location of project activity
A.2.1. Host Party(ies)
>>
India

A.2.2. Region/State/Province etc.
>>
Himachal Pradesh

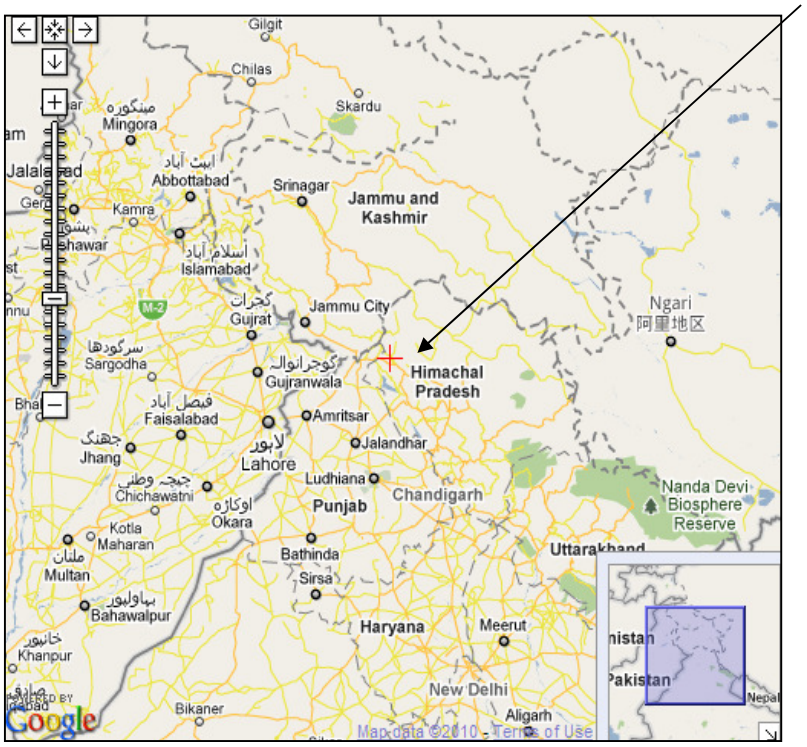
A.2.3. City/Town/Community etc.
>>
Village: Batot & Kawari
District: Chamba

A.2.4. Physical/ Geographical location
>>
The small hydro power project is proposed to be located in Chamba district of Himachal Pradesh, about 39 km from Chamba town and 478 km from Shimla. It envisages utilization of water of Balij Ka Nala, a tributary of river Ravi. The geographical details of the project are as below.

- Latitude: 32.2844
- Longitude: 76.1000
- River: Balij Ka Nala, a tributary of river Ravi
  Source: http://www.meteonorm.com/pages/en/meteonorm-6-online.php?glat=32.74&glon=76.09



Project Site



A.3. Technologies and/or measures

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Batot Hydro Power Limited, Mumbai has proposed to install a unit of 3.5 MW with following structures and facilities:

- Boulder Weir with side intake, Bottom outlet and Fish ladder
- Approach channel and Desilting basin
- Cut and Cover section
- Power tunnel
- Restricted Orifice type Surge Shaft
- Steel Penstock Bifurcating into two branches to lead discharge into two turbines
- Power house: surface type, housing 2 turbines of 1.75 MW
- Tail race for letting out the discharge back to Balij ka Nala via RCC duct
- Switchyard for evacuation of power at 33 kV to nearest HPSEB substation of Jarangla.

Power house for the Balij ka Nala small hydro power project is proposed on the right bank of Balij ka Nala near village Kawari.

The average lifetime of the project as per the implementation agreement signed with Government of Himachal Pradesh is 40 years. Most of equipment may have to be replaced or refurbished before 40 years. Hence, PP has not mentioned life periods of individual equipment.

As per the third party DPR, the project is expected to generate 14.10 Million kWh power per year. This results in a plant load factor (PLF) of 46.00%. This PLF has been estimated as per generation estimated by a third party DPR and it is in line with para. 3 (b) of EB 48 annex 11.

The project consists of 2 units of 1.75 MW capacity each. Power will be generated at 3.3 kV and stepped up to 33 kV for interfacing with the grid at the nearest Himachal Pradesh State Electricity Board's substation.

Brief technical details are as follows:

Power house:

(i)	Type	Surface
(ii)	Head (m):	
	- Gross	91.25 m
	- Design	88.73 m
(iii)	Size of power house:	
	(a) Length (m)	24.95 m
	(b) Width (m)	9.5 m
	(c) Height (m)	13.2 m
	(d) Machine Hall floor level	EL 1468.0 m
(iv)	Installed capacity	2 x 1750 kW

(v)	Turbine (s):	
	- Type	Horizontal Francis
	- Number	2 nos.
	- Capacity	1750 kW + 15% Overload
(vi)	Type of Generator:	Synchronous , Brushless Type
(vii)	Power house crane / lifting tackle capacity	EOT Crane, 20 T capacity of main hook, 5T capacity of auxiliary hook

(a)	*Diversion Structure (Head works)*	
i)	Type of Structure	Boulder Type Weir
ii)	Length	32 m
iii)	Maximum Discharging Capacity	517.67 cumecs with 4.2 m depth of flow over the crest
iv)	Gates	
	Number of gates	1 no. at Intake & 1 no. at Bottom Outlet
	Type of gates	Vertical Lift Gates
	Size of gates	Intake: 3.0m (wide) x 4.0m (high) & Bottom Outlet: 2.5m (wide) x 3.0m (high)

(b)	*Water Conductor System*	
1.	*Intake & Approach Channel*	
	Length	5.0 m
	Size	3 m x 3.0 m
	Bed Level	EL 1556.0 m
2.	*Desilting Tank*	
	Type	Dufour Type
	Length	57.0 m (including u/s & d/s transitions)
	Width	11.0 m
	Depth	3.0 m
3.	*Cut and Cover*	
	Type	D – Shaped, RCC Construction
	Length	124.89 m

	Size	2 m x 2.5 m
	Gate	1 no., 2m (wide) x 3m (high)
4.	*Power Tunnel*	
i)	Length	1020.8 m
ii)	Shape & Type	D - Shaped Concrete lined Tunnel
iii)	Size	Width = 2m, Height = 2.5 m
v)	Thickness of Concrete lining	150 mm
vi)	Design Discharge	4.65 cumecs + 15% overload
(c)	*Surge Shaft*	
i)	Type of surge shaft	Restricted Orifice, 935 mm dia
ii)	Size of surge shaft	Dia of 4.5 m
iii)	Max. Up Surge Level	EL 1562.79 m
iv)	Min. Down Surge Level	EL 1553.29 m
v)	Lining	300 mm thick RCC Lining
(d)	*Penstocks*	
i)	*Number*	*1 no.*
ii)	*Diameter and thickness*	*1500 mm dia, 8 mm thick*
iii)	*Length*	*205 m*
iv)	*Bifurcation at lower end*	*Bifurcation's yielding two pipes of 1060 mm dia each.*
v)	*Invert Level at inlet*	*EL 1548.25 m*
vi)	*Design discharge*	*4.65 cumecs + 15% Overload*
vii)	*Material*	*ASTM 285 Grade "C"*
	TAILRACE	
(i)	*Shape*	*Two Rectangular RCC ducts emanating from each unit and merging together in a rectangular open channel*
(ii)	*Length from centre line of units*	*30 m*
(iii)	*Tail Water Level*	*EL 1467.75 m*

(iv)	*Number of draft-tube gates*	*2 nos., Vertical Lift gates, 2310 mm (wide) x 1500mm (high)*

Tailrace:

Shape	Two Rectangular RCC ducts emanating from each unit and merging together in a rectangular open channel
Length from centre line of units	30 m
Tail Water Level	EL 1467.75 m
Number of draft-tube gates	2 nos., Vertical Lift gates, 2310 mm (wide) x 1500mm (high)

Switchyard:

1. Voltage level: 3.3/33 kV
2. Size: 10m × 8m

Monitoring equipment and their location in system:
The details about the monitoring equipment and their location in system have been specified in the project boundary diagram illustrated in PDD section B.3

Technology transfer:
The project activity has taken technology which is indigenously developed and there is no transfer of technology caused due to the project activity.

In absence of the project activity, the NEWNE Grid would have procured an equivalent amount of electricity as generated by the project from fossil fuel based power projects. The project activity would contribute in reducing emission of GHGs. Further, the generation of energy from hydel power would replace the energy generation from fossil fuels and reduce the usage of fossil fuels. This would in turn contribute to the global as well as national energy security.

The development of the project activity is reducing and would reduce the Green House Gas (GHG) emissions produced by the NEWNE grid generation mix, which is mainly dominated by fossil fuel based power

A.4. Parties and project participants

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

A.5. Public funding of project activity

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No public funding (Including Official Development Assistance – ODA) has been availed from parties included in the Annex I for the project activity.

A.6. Debundling for project activity

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According to A*ppendix C*[3] of the *simplified modalities and procedures for small-scale CDM project activities*, '***de-bundling'*** is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a larger project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities.

Further as per *paragraph 2* of *appendix C* - A proposed small-scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

The present project activity is not a de-bundled component of a large project activity as the project proponent has not registered any other small scale CDM project activity of same project type/category within a project boundary of 1 km prior to the present project activity.

[3] Appendix C to the simplified M&P for the small-scale CDM project activities, http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf

SECTION B. Application of selected approved baseline and monitoring methodology
B.1. Reference of methodology
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Type: I – Renewable Energy Projects
Category: D – Electricity generation for a system
Sectoral Scope: 1 – Energy industries (renewable / non renewable sources)
Title: Grid connected renewable energy generation
Reference: AMS I.D. (Version 17, EB 61)

Methodological Tools:
"Tool to calculate the emission factor for an electricity system" (Version 02.2.1, EB 63)

B.2. Project activity eligibility
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As per Version 17 of AMS-I.D *Grid connected renewable energy generation* following are different criteria for small-scale renewable energy. The justification is mentioned with each of the criterion.

Sr. No	Criterion	Justification
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:[4] (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The proposed CDM project activity comprises renewable electricity generation using hydro resource present in the region. The generated power will be exported to the grid and it will displace electricity from the NEWNE grid, which is a fossil fuel dominated power system. Hence justified.
2	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A[5]) applies is included in Table 2.	The project activity supplies electricity to the NEWNE grid of India[6] and hence application of methodology AMS-I.D is justified in line with Table 2 of the methodology.

[4] Refer to EB 23, annex 18 or the definition of renewable biomass.
[5] AMS-I.D "Grid connected renewable electricity generation", AMS-I.F "Renewable electricity generation for captive use and mini-grid" and AMS-I.A "Electricity generation by the user"
[6] The same can be confirmed via the commissioning certificate issued by HPSEB dated 19/06/2012

3	*This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).*	The proposed CDM project activity involves the installation of a small hydro power plant at a site where there was no renewable energy plant operating prior to the implementation of the project activity. Therefore, the project activity meets this criterion.
4	Hydro power plants with reservoirs[7] that satisfy at least one of the following conditions are eligible to apply this methodology: The project activity is implemented in an existing reservoir with no change in the volume of reservoir; The project activity is implemented in an existing reservoir, [8] where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2.	The proposed CDM project activity does not involve reservoir and the project activity is across the *Balij ka Nalla*, a tributary of river Ravi. Hence, essentially, the project can be classified as a run of the river[9] small hydro project.
5	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel,[10] the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity meets this criterion since it is a 3.5 MW[11] renewable energy project and does not involve co-firing. There is no unit addition which co-fires fossil fuel and it does not exceed the limit of 15 MW.
6	*Combined heat and power (co-generation) systems are not eligible under this category*	Not applicable as the proposed CDM project activity does not involve the installation of a cogeneration system.

[7] A reservoir is a water body created in valleys to store water generally made by the construction of a dam.
[8] A reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity.
[9] This fact can be confirmed via the DPR and also DOE's site visit
[10] A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.
[11] As per the Detail Project Report dated August 2005

7	*In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.*	Not applicable as the proposed CDM project activity is a new facility and does not involve the addition of renewable energy generation units at an existing renewable power generation facility.
8	*In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.*	Not applicable as the project activity is entirely new project i.e. Greenfield project.

Thus based on the above points, application of AMS-I.D version 17 is justified.

B.3. Project boundary
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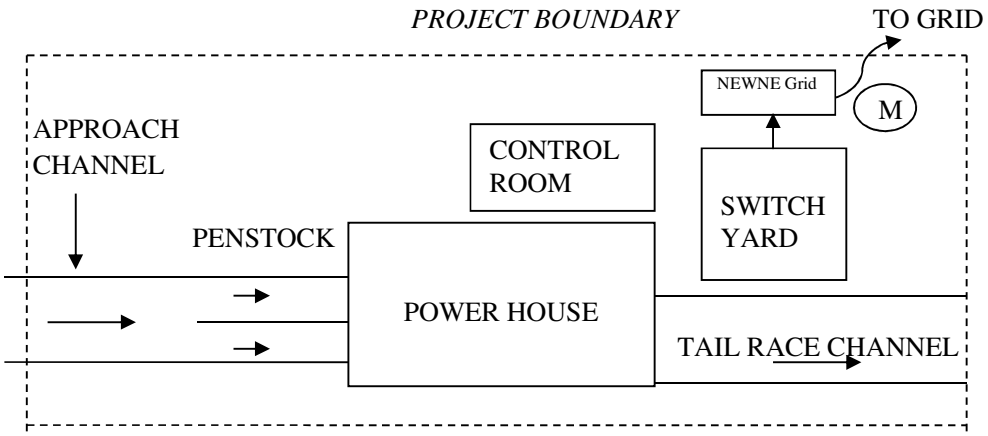
The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.



M: Metering Point – This is where $EG_{BL,y}$ is measured

GHG emission source

B.4. Establishment and description of baseline scenario

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As per paragraph 10 of the methodology AMS-I.D. (Version 17, EB 61), the baseline scenario is defined as: "*If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.*"

Baseline emissions are the product of electrical energy baseline $EG_{BL,\ y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor:

$$BE_y = EG_{BL,\ y} * EF_{CO2,grid,y}$$

Where:
BE_y: Baseline Emissions in year y; tCO_2
$EG_{BL,\ y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,grid,y}$: CO_2 emission factor of the grid in year y (tCO_2/MWh)

In absence of the project activity, the grid would have been operated with conventional fossil fuel based power projects.

B.5. Demonstration of additionality

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The relevant national laws and regulation pertaining to generation of energy are:

- Electricity Act 2003[12]
- National Electricity Policy 2005[13]
- Tariff Policy 2006[14]

The project activity is in conformance to all the applicable laws and regulations in India:

- Power generation using hydel power is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage such power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.
- Himachal Pradesh Hydro Policy[15]

As the project activity utilizes renewable source of energy, the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity.

[12] http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf
[13] http://pib.nic.in/archieve/others/2005/nep20050209.pdf
[14] http://www.karmayog.org/redirect/strred.asp?docid=2176
[15] http://www.hpseb.com/hydro_policy.htm

In order to show 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, "Tool for the demonstration and assessment of additionality" (Version 06.0.0, EB 65) is used. According to this tool, investment analysis is carried out in order to determine that the proposed project activity is not: 1) the most economically or financially attractive, or 2) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Investment analysis

Financial indicator

According to the "Guidelines on the assessment on investment analysis" (Version 05, EB 62), *both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate.*

The project proponent has conducted financial analysis for a period of 20 years taking the equity IRR as the financial indicator to prove additionality. As the project proponent has chosen a period (of 20years) shorter than the expected operational lifetime of the project activity, a residual or salvage value has been added as an inflow at the end of 20^{th} year of operation.

Calculations of Equity IRR

The project proponent has conducted investment analysis and calculated Equity IRR as **11.61%.**

Key parameters used for estimation of Equity IRR are listed below:

Description	Value	Units	Source
Total Capacity	3.50	MW	DPR
Auxiliary Consumption and other losses	8%[16]	%	DPR
Gross Electricity Production	14.10	Million kWh	DPR
Net Saleable energy	12.97	Million kWh	Calculated
Plant Load Factor (PLF)	45.99%	%	Calculated
Water Royalty: 0% to HP Govt for 1 to 15 year	0.00	Million kWh	DPR
Water Royalty: 10% to HP Govt 16 yr onw	1.30	Million kWh	DPR
Net Saleable energy for 1 to 15 year	12.97	Million kWh	Calculated
Net Saleable energy for 16 yr onw	11.68	Million kWh	Calculated
Per unit sale price for power	2.45	INR/unit	DPR (Incl. 2% rebate)
Book Depreciation (Civil)	3.34%	%	Companies Act 1956
Book Depreciation (Plant&Machinery)	3.40%	%	IT act
IT Depreciation (Civil)	3.40%	%	Companies Act 1956
IT Depreciation (Plant&Machinery)	3.40%	%	Reference[17]
O&M charges	1.50%	%	DPR
Escalation in O&M	5.00%	%	DPR
Interest rate on LT debt	10.00%	%	DPR
Interest rate on working capital	13.75%	%	DPR
Corporate Tax Rate	33.66%	%	Applicable in FY 2005-06[18]
Minimum Alternate Tax (MAT) Rate	8.42%	%	Applicable in FY 2005-06[19]
Total Project Cost	232.62	INR Million	Calculated
Debt Contribution	150.00	INR Million	DPR
Equity Contribution	82.60	INR Million	DPR
MNRE Subsidy	31.88	INR Million	Calculated as per MNRE policy 2003

Estimation of Benchmark:

As the Project Proponent has conducted financial analysis taking the Equity IRR as the financial indicator to prove additionality, return on equity has been considered to be the appropriate indicator for benchmark. The same has been estimated based on the Capital Asset Pricing Model (CAPM) using values available in the public domain.

Choice of Index for estimation of Market returns:

Project Proponent had 3 options to estimate the Market risk premium for the project activity. It can use historical return values of Sensex, BSE 500 and BSE 200. Sensex comprises of 30 companies only.

[16] Break-up - Auxiliary Consumption- 0.5%, Transformation losses - 0.5%, Transmission losses - 2%, Loss due to outages 5%
[17] http://www.powermin.nic.in/acts_notification/generating_companies.htm
[18] www.ajaygarg.com/RATES%20OF%20INCOME%20TAX.doc
[19] www.ajaygarg.com/RATES%20OF%20INCOME%20TAX.doc

Further, it consists of historical data since 1978-79. Indian economy had a major transformation post 1991 and hence Sensex may not be representative of the average expected return by and equity investor. Thus PP has not considered Sensex further.

PP now had the option to consider BSE 200 and BSE 500 both of which indices comprise of a large set of companies in diversified sectors. However, for BSE 500, historical data is available from 1999 whereas for BSE 200 data is available from 1991. Thus, more vintage data is available for BSE 200 as compared to BSE 500 and PP has chosen BSE 200 to estimate the Benchmark.

Expected Return on Equity = $R_f + \beta * (R_m - R_f)$

Where:
R_f = Risk free rate of return
β = Beta
R_m = Expected Return of the market

In order to calculate the benchmark for the Equity IRR, following steps have been undertaken:

Risk free rate of return (R_f):
The Yield-To-Maturity (YTM) of SGL transactions in central government dated securities for 20 Yr Maturity at the end of May 2005 [20] (viz. 7.4963%) has been considered as the risk free rate of return (R_f).

Beta (β):
The beta (β) for this project has been calculated taking the variance in the market (BSE 200) and variance in stocks (For a set of comparable companies engaged predominantly in the business of power generation) for a period of five years (60 months) prior to the decision making date.

The list of companies used for comparison is as below:

Sr. No	Company Name
1	CESC Ltd.
2	Gujarat Industries Power Co.Ltd.
3	Neyveli Lignite Corpn.
4	BF Utilities
5	Tata Power Co. Ltd.
6	Reliance Infrastructure
7	NTPC

Note: For some companies which do not have data available for 60 months prior to decision making date, the β has been calculated using the data available from the date of listing on the stock exchange.

Market returns (R_m): This is calculated based on BSE 200 close value for base year (02 January 1991) and data prior to decision making (August 2005). Using Compound Annual Growth Rate (CAGR) formula,

R_m= (978.28/131.09) ^ (1/14.58)-1 = 14.79%.

[20] http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=6808

This beta (β), return on market (R_m) and risk free rate of return (R_f) has been used in the standard Capital Asset Pricing Model (CAPM) formula to arrive at a benchmark for comparing the Equity IRR i.e Return on Equity (ROE). Using the above values in the CAPM formula, benchmark has been calculated as **16.82%.**

Sensitivity Analysis:
The sensitivity analysis break-even point has been shown in following table:

Change in net generation	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**16%**
Equity IRR	14.96%	11.61%	8.45%		17.04%
Change in Power Sale tariff	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**16%**
Equity IRR	14.96%	11.61%	8.45%		17.04%
Change in O&M Cost	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**-109%**
Equity IRR	11.12%	11.61%	12.10%		16.88%
Change in Total Project Cost	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**-12%**[21]
Equity IRR	8.09%	11.61%	16.25%		17.35%

From the above sensitivity analysis, it can be observed that the proposed project activity is not financially/economically attractive with respect to the calculated benchmark in various scenarios wherein there are changes in tariff, O&M cost, net saleable units and project's capital cost, the Equity IRR does not cross the benchmark.

Discussion on likelihood of Equity IRR meeting or exceeding the break-even points:

1. **Net Generation:** The Net generation value has been estimated by a third party based on 20 year historical data measured at the site. Consideration of data for such a long duration leads to averaging of the inter-annual variances thus giving a realistic and accurate generation estimate. Thus it is unlikely that the estimate net generation would increase by as high as 16%. Also, it would be prudent to note that due to implementation related constraints and delays, the actual project cost has increased by more than 50% and hence there would be no impact on financial additionality with the above increase in the net generation.

2. **Power Sale Tariff:** The project proponent had envisaged to sell the power to the state utility at preferential tariff (net of 2% rebate) of 2.45 Rs./kWh. The preferential tariff is estimated for a

[21] This scenario is not possible as the actual project cost is more than 50% higher than that envisaged by the PP at the time of investment decision.

long term (typically 20 years or more) based on the levelized cost of generation and hence remains fixed for the long term duration. Hence an increase in tariff by16% or more from the first year of operation is unlikely and an unrealistic scenario.

3. **O&M Cost:** Due to the hilly terrain in the state of Himachal Pradesh and specifically near the project site, the O&M costs are much higher than that estimated by the project proponent. Also, it would be prudent to note that due to implementation related constraints and delays, the actual project cost has increased by more than 50% and hence actual O&M cost (viz. a % of project cost) is higher. Hence there is no likelihood of a occurrence of scenario wherein a decrease in O&M cost leading to Equity IRR crossing the benchmark.

4. **Total Project Cost:** The scenario wherein the project cost would decrease making Equity IRR cross the benchmark is not realistic as the project has already been implemented today and the actual project cost incurred is more than 50% higher[22] than that assumed by PP at the time of taking the investment decision.

Note: PP has considered MNRE subsidy in the financial analysis however, in actual scenario, PP will not be receiving the same due to delayed project implementation and commissioning.

Thus, overall, it can be concluded that revenue from sale of CERs is important to reduce this gap and hence the project has been considered to be additional.

[22] A Chartered Accountant (C.A.) has certified the actual cost incurred by the PP on the project activity.

CDM Chronology:

The detailed chronology of events relating to CDM consideration and project implementation has been enlisted below:

CDM related events	Date	Project implementation related events
Offer for CDM consultancy Services by MITCON (Prior awareness of CDM)	20/04/2005	
	February 2005-March 2006	Land acquisition process[23]
Receipt of Detailed project Report (DPR) from Third party	August 2005	
Board Decision to implement the project considering additional revenue from sale of CERs (Serious CDM consideration)	23/08/2005	
	31/01/2006	Term Loan Sanctioned
	16/03/2006	Signing of the E&M contract (Project start date)
	14/04/2006	Order placed to Trust House Constructions for approach road and tunnel work
Offer for Carbon Credit Services received from Headway Capital Advisors[24]	23/04/2007	
	08/11/2007	Termination of contract with Trust House due to inability in completing the tunnel work.[25]
Inter office correspondence discussing project implementation being on hold due to delay in tunnel work. The note also suggested finalising of CDM consultant after seeing visible progress on ground on project implementation.	04/12/2007	

[23] **Note:** The land acquisition process was initiated in February 2005 and the same was completed by end of March 2006 (i.e. after Start date 16 March 2006). More than 50% of the acquired land was private agricultural land which was bought by PP from individual land owners (buying small individual plots from each owner) and this process takes a long time in India. In case, after buying of land, PP would have decided against implementing the project, the land could have been utilized for any other purpose like agriculture whereas the forest land, which was allotted on a nominal lease rent by the government of India, would have been surrendered back. This process always goes in parallel to due diligence/feasibility studies/hydrology study. Also it is to be noted that the DPR which confirms the possibility of project was only available in August 2005 i.e after start of land acquisition process and hence the initiation of land acquisition cannot be seen as a project real action as the PP is unsure about the feasibility of the project at that time. None of the land purchase agreements restrict use of land any specific purpose. Further, the cost of land acquisition is less than 3% of the overall project cost and hence does not have any material impact on the overall project implementation decision.

[24] This offer letter was received in response to PP's request for proposal for CDM advisory services sent on 02/02/2007

[25] Contractor had abandoned work and asked for an unreasonable price hike

	24/01/2008	Contract for tunnel work awarded to a new contractor (Vinayak construction company)
	18/11/2008	Cancellation of contract with Vinayak construction company due to unreasonable delays and work completion and non-execution of order within the contractual period.
	27/01/2009	Contract was awarded to third contractor (Sunrise construction company) for completion of tunnel work
Inter office correspondence between the top management discussing progress made in tunnel work and overall project implementation. Decision taken to re-initiate the CDM process and hence invite offers from consultants for CDM advisory services	16/03/2009	Progress achieved in completion of tunnel work after being on hold for almost 3 years.
Request for proposal sent by PP to multiple CDM consultants (Zenith, CTRAN, E&Y etc) for CDM validation services	16/04/2009	
Receipt of quotations/proposals for CDM advisory services from various consultants	From April 2009 up to July 2009	Project construction activities on-going at the site.
Appointment of CDM consultant	04/09/2009	
Local stakeholder consultation meeting conducted at the site for getting their feedback.	23/11/2009	
First appointment of DOE for initiation of validation for the project	02/11/2010	
Submission of PDD for completeness check to the DOE	10/12/2010	
Delay in web hosting of PDD by DOE	January – April 2011	
Meeting with DOE team to discuss the delay in initiation of validation process	11/05/2011	
Request for short closure letter received from DOE for termination of validation contract via eMail	19/08/2011	
Termination of contract with 1st DOE (Letter sent	04/02/2012	

by PP) due to non-initiation of validation process by the 1st DOE for more than 1 year after contract signing.		
Discussions with a new DOE for validation of project activity & receipt of formal offer from DOE	11/06/2012	
	16/06/2012	Completion of construction activities and commissioning of the hydro power project
2nd DOE Appointment for validation of project activity	27/07/2012	

As it is evident from the chronology listed above, the PP was aware of CDM prior to taking investment decision and CDM revenues were a key parameter considering which the decision to invest in the project activity was taken by PP. However, due to technical constraints (building of tunnel), the project implementation was on a standstill till almost 3 years after its start date.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The procedure followed for estimating the emissions reductions from this project activity during the crediting period are as per the following steps which corresponds with AMS-I.D.

Steps	Description	Equation used	Methodological choices
1.	Procedure followed for calculating Baseline emissions	$BE_y = EG_{BL,y} \times EF_{CO2,Grid,y}$	The Grid Emission Factor ($EF_{CO2,Grid,y}$) has been calculated using operating and built margin emission factor taken from CEA published data. The net electricity export ($EG_{BL,y}$) is the difference between the electricity exported to the grid and the electricity imported from the grid.
2.	Procedure followed for calculating Project emissions (PE_y)	$PE_y = 0$	As per the applied methodology, for renewable energy projects. project emissions have to be considered as zero. Since project activity is a small hydro power project (Renewable project), $PE_y = 0$.
3.	Procedure followed for calculating Leakage emissions (LE_y)	$LE_y = 0$	Since no energy generating equipment is transferred from another activity, no leakage emissions are considered.
4.	Procedure followed for calculating Emission reduction (ER_y)	The emission reductions are calculated as per equation $ER_y = (BE_y - PE_y - LE_y)$	

In this case, $EF_{CO2,Grid,y} = EF_{Grid,CM,y}$ and $EG_{BL,\ y} = EG_{facility,\ y}$

Method of calculation of combined margin emission factor: "Tool to calculate the emission factor for an electricity system", Version 02.2.1, EB 63 (Annex 12).

The combined margin calculations estimate the baseline emission factor for grid. It consists of a combination of operation margin (OM) and build margin (BM) factors obtained from publication issued by Central Electricity Authority (CEA) of India- CO_2 Baseline Database for the Indian Power Sector, Version 07.

Calculation of the Baseline Emission Factor

As per version 2.2.1 of Tool to calculate emission factor for an electricity system, following steps are included in the calculation of the emission factor for the baseline scenario:

STEP 1: Identify the relevant electricity systems.
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3: Select a method to determine the operating margin (OM).
STEP 4: Calculate the operating margin emission factor according to the selected method.
STEP 5: Calculate the build margin (BM) emission factor
STEP 6: Calculate the combined margin (CM) emissions factor.

The Central Electricity Authority (CEA) has published CO_2 baseline database in its version 7.0 (January, 2012)[26]. The values for OM, BM, CM are given excluding and including imports. For the present project activity, including imports are considered.

Step 1: Identifying the relevant electricity system
Grid/project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Southern grid and the NEWNE Grid form the two independent regional grids of India. As the project activity is located in the state of Himachal Pradesh, the NEWNE grid is applicable to the proposed CDM project.

Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional gird in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE grid has been chosen as the relevant electricity system.

Note: PP has referred to the CEA CO_2 baseline database (Version 07) to source the value for Simple Operating Margin. As per CEA[27], adjustments for imports from other Indian grids are based on operating margin of exporting grid. For imports from other countries, an emission factor of zero is used. This is in line with "Tool to Calculate the Emission Factor for an Electricity System", Ver. 2.2.1 (p.4), option b.

[26] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
[27] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

PP would like to clarify that for the purpose of estimation of the baseline emission factor, the NEWNE grid has been chosen as the relevant project electricity system. Hence Electricity transfers from NEWNE grid to other grid(s) will be considered as exports. PP would also like to confirm that electricity exports have not been subtracted from electricity generation data used for calculating the emission factor.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional).
Off-grid power plants have not been included in the project electricity system

Step 3: Selection of an Operating Margin method
The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the baseline. The use of the Simple OM method is justified as the share of the low cost/ run resources constitute less than 50% of the total grid generation.

The data pertaining to the total grid generation and the low/cost must run resources have been included in Annex 3.

	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	18.5%	19.0%	17.4%	15.9%	17.6%
South	28.3%	27.1%	22.8%	20.6%	21.0%
India	20.9%	21.0%	18.7%	17.1%	18.4%

Note: As per the above information, it can be clearly established that the share of the low cost/ run resources constitute to less than 50% of the total grid generation.

With regards to data vintage, the project participant wishes to use the ex-ante option wherein the project proponent wishes to use the ex ante option wherein the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

Step 4: Calculation of the OM according to the Simple OM method
The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The data provided by the Central Electricity Authority (CEA), an official data source has been relied upon for the calculation of the OM. The same has been detailed in Annex 3. The latest version of the database, Version 7 (January, 2012) has been used. The OM calculations have been based upon generation data, fuel consumption and the Net Calorific value (NCV) of the fuel.

Option A has been chosen for calculating Operating Margin emission factor for the project. OM has been determined based on fuel consumption and net efficiency generation of each power plant/ unit, since fuel consumption data for each power plant/ unit is available.

Assumptions
The following assumptions have been made in case of unavailability of data at station level:

Net generation: In case of stations where only gross generation is available, CEA standard values for auxiliary consumption have been applied to calculate the net generation data.

GCV: Default GCV values for some thermal power stations have been used for cases where station specific data was unavailable.

The following assumptions have been in case of unavailability of data at unit level:
Net generation: The data is not monitored at a unit level and hence the following assumptions have been made:

1. The auxiliary consumption (in % of gross generation) of the unit was assumed to be equal to that of the respective stations in the following cases:
- All units of a station fall into the build margin; or
- All units of a station have the same installed capacity; or
- The units in the station have different capacities but do not differ with respect the applicable standard auxiliary consumption.

2. In all other cases, standard values for auxiliary consumption adopted by CEA were applied.

Fuel consumption and GCV: Fuel consumption and GCV are generally not measured at unit level. Instead, the specific CO_2 emissions of the relevant units were directly calculated based on heat rates.

Calculation Approach
The Simple OM has been calculated using the following formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y}$$

Where:
$EF_{grid, OM simple, y}$ Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i, y}$ Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i, y}$ Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2, i, y}$ CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i All fossil fuel types combusted in power sources in the project electricity system in year *y*
y The relevant year as per the data vintage chosen in Step 3

As per Annex 3, the last 3 year OM values are 1.0066, 0.9777 and 0.9707 tCO_2/MWh.

The 3-year generation-weighted average was taken and the same has been derived as $EF_{grid,OM,y}$ = 0.9842 tCO_2/MWh

Step 5: Calculate the build margin emission factor

In terms of vintage of data, PP has chosen Option 1, i.e. for the first crediting period; the build margin emission factor has been calculated ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid, BM, y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m, y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL, m, y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

As described above, the Build Margin has been estimated ex-ante for the the first crediting periodas per the most recent data available (from CEA[28] for 2010-11 in its CO_2 baseline database version 07) has been used and the build margin thus calculated by CEA is 0.8588 tCO_2/MWh

Note: CEA calculates the Build Margin as per the steps defined in "Tool to Calculate the Emission Factor for an Electricity System", Version 02.2.1 and then releases the Build margin value for a particular year. As PP directly sources this value from CEA, PP has not demonstrated the step-wise approach as per the above tool in the PDD.

Therefore, $EF_{grid,BM,y}$ = 0.8588 tCO_2/MWh

Step 6: Calculation of the combined Build Margin emission factor
The combined margin emission factor will be calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where,

$EF_{grid, BM, y}$	= Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid, OM, y}$	= Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	= Weightage of operating margin emissions factor (%)
$_{BM}$	= Weightage of build margin emissions factor (%)

As per the 'Tool to calculate the Emission Factor for an electricity system' version 02.2.1, the default values for w_{OM} and w_{BM} are taken as 0.5 and 0.5 respectively as per the guidance provided for hydro project activities for the first crediting period and subsequent crediting periods.

Hence, the Baseline Emission Factor is calculated using the formula stated below:
$EF_{grid, CM, y} = w_{OM} * EF_{grid, OM, y} + w_{BM} * EF_{grid, BM, y}$

Project Emissions
For most renewable energy project activities, *PEy* = 0.

Leakage Emissions
If the energy generating equipment is transferred from another activity, leakage is to be considered else LE_y = 0.

[28] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	Emission reductions in year y (tCO_2e/yr)
BE_y	Baseline emissions in year y (tCO_2e/yr)
PE_y	Project emissions in year y (tCO_2e/yr)
LEy	Leakage emissions in year y (tCO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**W_{OM}**
Unit	%
Description	Weightage of operating margin emissions factor
Source of data	Latest version of the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)
Value(s) applied	0.50
Choice of data or Measurement methods and procedures	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 02.2.1
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**W_{BM}**
Unit	%
Description	Weightage of build margin emissions factor
Source of data	Latest version of the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)
Value(s) applied	0.50
Choice of data or Measurement methods and procedures	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 02.2.1
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,BM,y}$
Unit	t CO_2 /MWh
Description	Build margin CO_2 emission factor in year y (for NEWNE grid)
Source of data	CO_2 baseline database (Version 7.0) published by CEA in January 2012
Value(s) applied	0.8588
Choice of data or Measurement methods and procedures	The value of the build margin for the NEWNE grid has been calculated in accordance with the guidance provided in the "Tool to calculate the emission factor for an electricity system" Version 02.2.1, EB 63
Purpose of data	The data is required to estimate the baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO_2 /MWh
Description	Operating margin CO_2 emission factor in year y (for NEWNE grid)
Source of data	CO_2 baseline database (Version 7.0) published by CEA in January 2012
Value(s) applied	0.9842
Choice of data or Measurement methods and procedures	The value of the operating margin for the NEWNE grid has been calculated in accordance with the guidance provided in the "Tool to calculate the emission factor for an electricity system" Version 02.2.1, EB 63
Purpose of data	The data is required to estimate the baseline emissions
Additional comment	-

B.6.3. Ex-ante calculation of emission reductions

>>

Baseline Emissions:

As per the Detailed Project Report (DPR), net generation for the 3.5 MW Project is 12.97 Million kWh per year.

Therefore, Net annual Generation Capacity of Project Activity supplied to grid = $\mathbf{EG_{facility,y}}$ =12,973 MWh

$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$
$= 0.5 * 0.9842 + 0.5 * 0.8588$
$= 0.9215$ tCO_2/MWh

Substituting the values in Equation (1) of PDD section B.4, we get

Baseline Emissions (BE_y) = 12,973 * 0.9215 = 11,954 tCO_2

Project Emissions

As described in PDD section B.6.1, $PE_{,FF,y}$= 0.

Leakage Emissions

As energy generating equipment is transferred from another activity, Leakage Emissions = 0 tCO_2

Emission Reductions = Baseline Emissions - Project Emissions – Leakage Emissions
= 11,954- 0- 0 = 11,954 tCO2e/year

B.6.4. Summary of ex-ante estimates of emission reductions

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
Year 1	11,954	0	0	11,954
Year 2	11,954	0	0	11,954
Year 3	11,954	0	0	11,954
Year 4	11,954	0	0	11,954
Year 5	11,954	0	0	11,954
Year 6	11,954	0	0	11,954
Year 7	11,954	0	0	11,954
Total	**83, 678**	**0**	**0**	**83, 678**
Total number of crediting years	**7 years**			
Annual average over the crediting period	**83, 678**	**0**	**0**	**83, 678**

B.7. Monitoring plan
B.7.1. Data and parameters to be monitored

Data / Parameter	**$EG_{facility,y}$**
Unit	MWh
Description	Quantity of net electricity supplied to the grid in year y
Source of data	The summation of all values calculated for 'Net saleable energy for Balij-ka-nallah-II HEP[29]'
Value(s) applied	12, 973 MWh
Measurement methods and procedures	Energy meters (both main and check meters) are installed at each feeder in the Jarangla substation to monitor the energy Exported and Imported. Net energy exported to the grid is calculated and recorded as a part of the Joint Meter Reading (JMR) report. The apportioning calculations are attached as an annexure to the JMR and PP performs the invoicing/billing based on this value only. The summation of all values calculated for 'Net saleable energy for Balij-ka-nallah-II HEP' will be considered for calculating the parameter **$EG_{facility,y}$**. The annexure attached to JMR will be used for sourcing these values. Archiving policy: Paper or electronic Responsibility: Statue Utility/HPSEB would be responsible for periodic testing and calibration (If necessary) of the main and check meters Accuracy Class of main and check meters: 0.2 S Testing & Calibration: All the meters will be tested annually and calibrated (If required) but at least once in three years
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results can be cross checked with records for sold/purchased electricity (e.g. invoices/billing receipts).
Purpose of data	The data will be used for estimation of baseline emissions of the project activity.
Additional comment	Data archiving: Crediting period + two years

B.7.2. Sampling plan
>>
As data and parameters monitored in section B.7.1 above are not determined by a sampling approach, the sampling plan is not provided.

[29] Balij-ka-nallah-II HEP is another name for the subject project activity used in the local region.

B.7.3. Other elements of monitoring plan

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The Monitoring and Verification procedures define a project specific standard against which the project's performance (i.e. GHG emissions) and compliance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and techniques for data interpretation, for monitoring and verifying GHG emissions with specific focus on technical/efficiency/performance parameters. It also allows scope for review, scrutiny and benchmarking against established norms for monitoring and verification. The Monitoring &Verification protocol provides a range of data estimation, measurement and collection options and techniques, in each case indicating preferred options consistent with good practice to allow Head- Projects, Plant-in-charge, Shift-in-charge, Panel operators to apply the most practical and cost effective measurement approaches to the proposed project activity. The aim is to enable this project to have clear, credible and accurate monitoring, evaluation and verification procedures. The responsible person and his/her responsibilities are given in following table.

Person	**Responsibility**
Panel operator	Data source and collection
Shift-in-charge	Review of data collected
Plant-in-charge	Data compilation and emission reduction calculations
Head-Projects	Review of final calculations

Note on apportioning of electricity:

As the joint meter reading (JMR) taken at the 33/11 kV Jarangla substation (both at feeder-1 & feeder-2) measures electricity exported & imported not only by the project activity but also by projects implemented by other PP's, there is apportioning an procedure followed to estimate the Quantity of net electricity supplied to the grid for the particular period by the project activity. This calculation is attached as an annexure[30] to the JMR and PP performs the invoicing/billing based on this value only.

[30] The summation of value calculated for 'Net saleable energy for Balij-ka-nallah-II HEP' will be considered for calculating the parameter $\mathbf{EG_{facility,y}}$

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>

16/03/2006, the date of placement of purchase order for the Electrical & Mechanical equipment to Kirloskar Brothers Limited

C.1.2. Expected operational lifetime of project activity

>> 40 years-0 months[31]

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Renewable

C.2.2. Start date of crediting period

>>

31/12/2012 (Or the date of registration of the project activity with UNFCCC whichever is later)

C.2.3. Length of crediting period

>>

7 years -0 months

[31] As per Implementation agreement with Government of Himachal Pradesh

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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As per the EIA notification 2006[32], given by the Ministry of Environment and Forests under the Environment (Protection) Act 1986, the project doesn't fall under the list of activities requiring EIA. The project will not involve any negative environmental impacts, as the electricity is being generated using hydro resource which is a clean source of energy, thus no EIA study was conducted.

There are no significant environmental impacts due to the implementation of the project activity. No environmental impact assessment has been undertaken since it is not required as per the regulations laid down by the Ministry of Environment and Forests, Govt. of India. Thus no references have been provided here

[32] http://www.envfor.nic.in/legis/eia/so1533.pdf

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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BHPL has identified different stakeholders for its small hydroelectric project in the Chamba district of Himachal Pradesh. The meeting was carried out by BHPL on 23rd November 2009. Following are the local stakeholders who were identified by the project proponent:

1. Village Grampanchayat Representatives
2. Local Villagers
3. Civil contractors
4. Company employees
5. Representatives from the local pollution control board

They invited identified stakeholders by sending them letters to attend the stakeholders meeting. Comments were invited from the attendees during the question and answer session and all their doubts were cleared by the team from BHPL.

E.2. Summary of comments received

>>

Local stakeholder consultation was carried out by BHPL on 23rd November 2009. The stakeholders consulted encouraged setting up of the project activity and opined that the project activity is beneficial to the local people in several ways.

The project activity will result in generation of direct and indirect employment opportunities for the local people, both during construction and operation phases. Since the project uses water as natural resources for generation of power, there would be reduction in specific consumption of fossil fuels which would in turn reduce the emission of greenhouse gases.

The stakeholders also pointed out that power generation through usage of renewable source of energy is environmentally friendly and they are happy with the project being implemented in the region. They also appreciated the development of surrounding area led by the implementation of the project activity.

A detailed list of feedback forms received from the stakeholders has been submitted to DOE during project's validation.

E.3. Report on consideration of comments received

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In summing up, the project has not received any negative or discouraging from the stakeholders. All the stakeholders appreciated and encouraged project proponent to carry out such activity in the region. In view of direct and indirect benefits (social, economic, and environmental), all stakeholders have supported the project activity. Hence, it is not required to take due account of the comments.

SECTION F. Approval and authorization

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The letter of approval from the host country Designated National Authority (DNA) for the project activity was not available at the time of submitting the PDD to the validating DOE. The PP had made an application for receipt of letter of approval and authorization from the host country DNA and the same was considered in the National CDM Authority (NCDMA) meeting dated 30/10/2012. The PP has now received letter of approval and authorization from the NCDMA vide its letter No. 4/16/2012-CCC dated 26/12/2012. A copy of the same has been provided to the DOE.

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Appendix 1: Contact information of project participants

Organization	Batot Hydro Power Limited
Street/P.O. Box	214, Dr D.N. Road
Building	Empire House
City	Mumbai
State/Region	Maharashtra
Postcode	400001
Country	India
Telephone	+91-22-22071501
Fax	+91-22-22071512
E-mail	weizmann@bom3.vsnl.net.in
Website	http://www.batothydropower.com/
Contact person	
Title	Director
Salutation	Mr
Last name	Kamath
Middle name	
First name	Ganesh
Department	
Mobile	+91 9323 7955 48
Direct fax	+91-22-22071512
Direct tel.	+91-22-22071501
Personal e-mail	gnkamath@weizmann.co.in

Appendix 2: Affirmation regarding public funding

There is no public funding available for the project activity

Appendix 3: Applicability of selected methodology

Refer the Section B.2 of PDD.

Appendix 4: Further background information on ex ante calculation of emission reductions

None. Refer to PDD section B.6.3 for information on ex ante calculation of emission reductions.

Appendix 5: Further background information on monitoring plan

None. Refer the Section B.7.3

Appendix 6: Summary of post registration changes

None.

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