Project design document form
(Version 10.1)

BASIC INFORMATION	
Title of the project activity	Baragran Hydro Electric Project, 3.0 MW (being expanded to 4.9 MW)
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	09
Completion date of the PDD	30/05/2018
Project participants	— KKK Hydro Power Limited — Bunge Emissions Fund Limited
Host Party	India
Applied methodologies and standardized baselines	Applied Methodology : AMS-I.D. Version 18
Sectoral scopes linked to the applied methodologies	01, Energy Industries (renewable/ non – renewable sources)
Estimated amount of annual average GHG emission reductions	25,967 tCO_{2e}

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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This project is located on Sanjoin nala, a tributary of Beas River near village Patlikuhl in Kullu District, Himachal Pradesh. The power potential of Sanjoin nala is being exploited through the existing Baragran HEP being operated by M/s KKKHPL. Baragran HEP is a run-of-the-river development envisaging utilization of surplus water available in Sanjoin nala. The surplus discharge available in the nala is proposed to be utilized to develop full potential Sanjoin Stream.

On the basis of the discharge measurement data available, it is seen that it is possible to exploit discharge and natural head to generate 4900 KW of power at economical cost. The increase in installed capacity from 3 MW to 4.9 MW can be achieved by utilizing higher discharge available in the nala.

The purpose of the project activity is to generate electricity by using the renewable hydraulic resources to meet the ever-increasing demand for energy in the northern region. The development of the project activity would reduce the Green House Gas (GHG) emissions produced by the northern regional grid generation mix of India, which is mainly dominated by fossil fuel based power plants[1].

This is small-scale project type – I and estimated annual average emission reduction 25,967 t CO_2e and estimated for entire 2nd crediting period of 7 years as 181,769 t CO_2e.

View of the project participant about the project activity's contribution to sustainable development

KKK Hydro Power Limited, which is the owner of the project activity, believes that the project activity has the potential to shape the economic, environmental and social life of the people in the region. The project activity is likely to have beneficial effect on agriculture, rural industries and employment in the region. Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines[2] for CDM projects.

The main purpose of the project activity is to generate electrical energy through sustainable means without causing negative impact on the environment and to contribute to the climate change mitigation efforts. Apart from the generation of electrical power, the project also contributes to the following:

a) Sustainable development, through utilisation of renewable hydro resources available in the project region.

b) Rural development due to the location of the project being in the rural area.

c) Capacity addition to the present installed capacity and increase in the energy availability

d) Generation of additional employment

SOCIAL WELL BEING:

Since the project activity is in the rural area, it would lead to the development of the region. It would significantly improve the conditions of the roads connecting site and nearby villages to existing roads.

Employment opportunities would be generated for local people, both during construction and operation phases.

The socio-economic conditions of the local people surrounding village like Baragran, Patlikuhl, etc. shall be improved by means of setting up of small scale/cottage industries in these villages

The project will also help locate, encourage and develop local entrepreneurs for the successful development of rural enterprises & for generation of non-farm employment.

ECONOMIC WELL BEING:

The project activity would generate employment in the local area. The project would create a business opportunity for local stakeholders such as suppliers, manufacturers, contractors etc.

ENVIRONMENTAL WELL BEING:

Since the project uses renewable hydroelectric resources for power generation, it doesn't lead to any emissions in the environment.

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.

The project will not cause any adverse effect on ecology of the area. Rather, it would improve the environment by providing pollution free source of energy to the people.

TECHNOLOGICAL WELL BEING:

The technology selected for the power project would use well-established Horizontal Francis machine with directly coupled Generator type turbines.

Development of small hydro locally with its well known and proved technology offers most attractive energy options as compared to petroleum, coal and wood based energy systems.

A.2. Location of project activity

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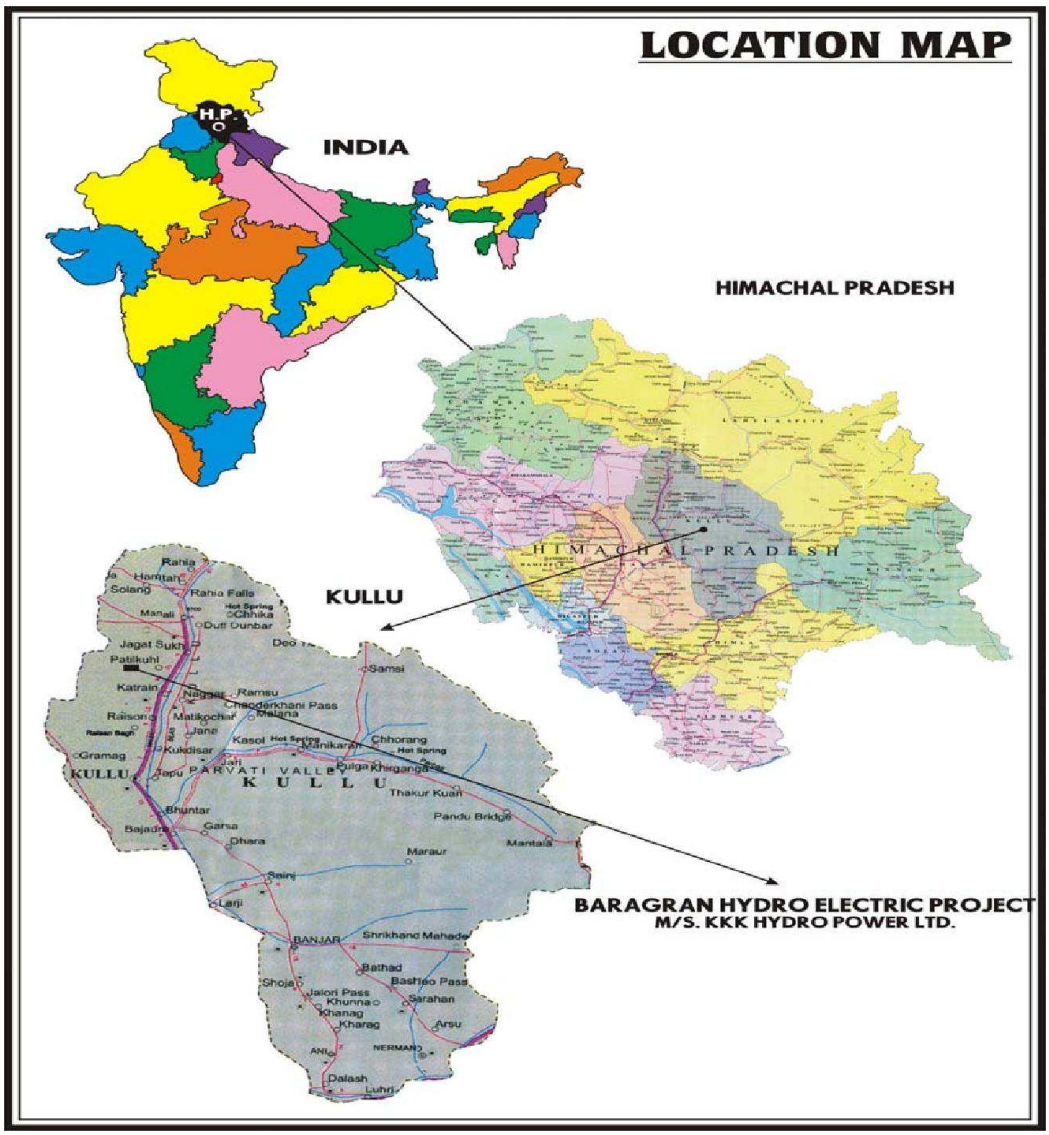
The project is located on Sanjoin nala, a tributary of Beas River near village Patlikuhl in Kullu district, Himachal Pradesh**.** The project site is approx. 25 km from Kullu off the Kullu - Manali State Highway near village Patlikuhl. A good motor able road exists up to diversion as well as powerhouse site.

The total catchment area up to proposed weir site is 58 sq. km. and is fan shaped. The total catchment area at the diversion site is 82.00 sq. km. The project lies between Latitudes $31^0$07' N to $31^0$13' N and Longitudes $77^0$04' E to $77^0$10' E.

The project site is easily accessible by road and air. The area can be approached from Patlikuhl town located on National Highway NH-21, by an all weather road. The distance from Kullu to Patlikuhl is about 20 km. The diversion site is located around 6 km from Patlikuhl and is connected by fair weather jeep able road at present. The powerhouse site is located near village Baragran on the right bank of Sanjoin nala before its confluence with Beas River.

The area around the project site is largely covered with overburden in the riverbed and adjoining terraces. Overburden consists of deep fill of ravine sediments whereas hill slopes are covered with slope wash material. The riverine terraces are mostly used as agricultural land. Rock outcrops are scanty. However, the hill slopes around the proposed project are stable and the area is conductive for constructing a small hydropower scheme on geological considerations.



A.3. Technologies/measures

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According to the categorization of Appendix B to the simplified modalities and procedures for small scale CDM project activities (http://cdm.unfccc.int/methodologies/SSCmethodologies) the project activity fits the type and category as specified below:

Type: - Renewable Energy Project

Category: - Grid connected electricity generation

Approved Methodology: AMS I.D., Version 18

Project Design & Technology:

This is a run-of-the-river development scheme of small hydropower projects in which the hydro power plant uses water limited to the rated capacity of the plant, from the natural flow of the river without storage.

The water shall be directed at an elevation of 1730.50 M through a trench weir and the silt will be eliminated at a de-silting unit after which it will be conveyed through partially an open channel and partially through cut and cover up to forebay which has a temporary storage of 3 minutes. From here the water shall be conveyed under pressure through penstock, which will run the turbine, which is housed, in the powerhouse. The water later on will be released into the river through tailrace stock.

The Technology used for generation of Power in the Baragran Hydro-Power Project is currently using Horizontal Francis Turbine (1500 KW) 2 Nos. these turbines have been selected based on available head at site and are ideally suited for such project.
The Baragran HEP has a potential of producing 4.9 MW power against the available gross head of 170 m and discharge of 2.7 m^3/s approx. At present Baragran HEP has installation of two 1.5 MW Horizontal Francis machines and an additional 1.9 MW is to be installed based upon the optimised plant capacity of 4.9 MW derived from the power potential studies.

In the view of better efficiency of the Francis turbine at higher load conditions as compared to Pelton turbine and discharge availability, Francis turbine is selected.

Basic Parameters

Gross Head	:	173.8 m
Design Discharge	:	3.75 m^3/sec
Installed Capacity	:	4900 KW (3000KW + 1900KW)
Generation Voltage	:	3.3 KV
Age/Average Time	:	40 Years

Plant Equipment

The turbine to be installed for the 1.9 MW would be of the same type as of 1.5 MW. The technical

Specifications of turbine are:

Turbine Type	:	Horizontal Francis Turbine with a directly coupled generator.
No. & Capacity	:	2 x 1500 MW & 1 x 1900 MW
Design Head	:	170 m
Rated Speed	:	100 rpm
Type of Generator	:	A.C. Synchronous
Age/Average Time	:	40 Years

In the view of better efficiency of the Francis turbine at higher load conditions as compared to Pelton turbine and discharge availability, Francis turbine is selected.

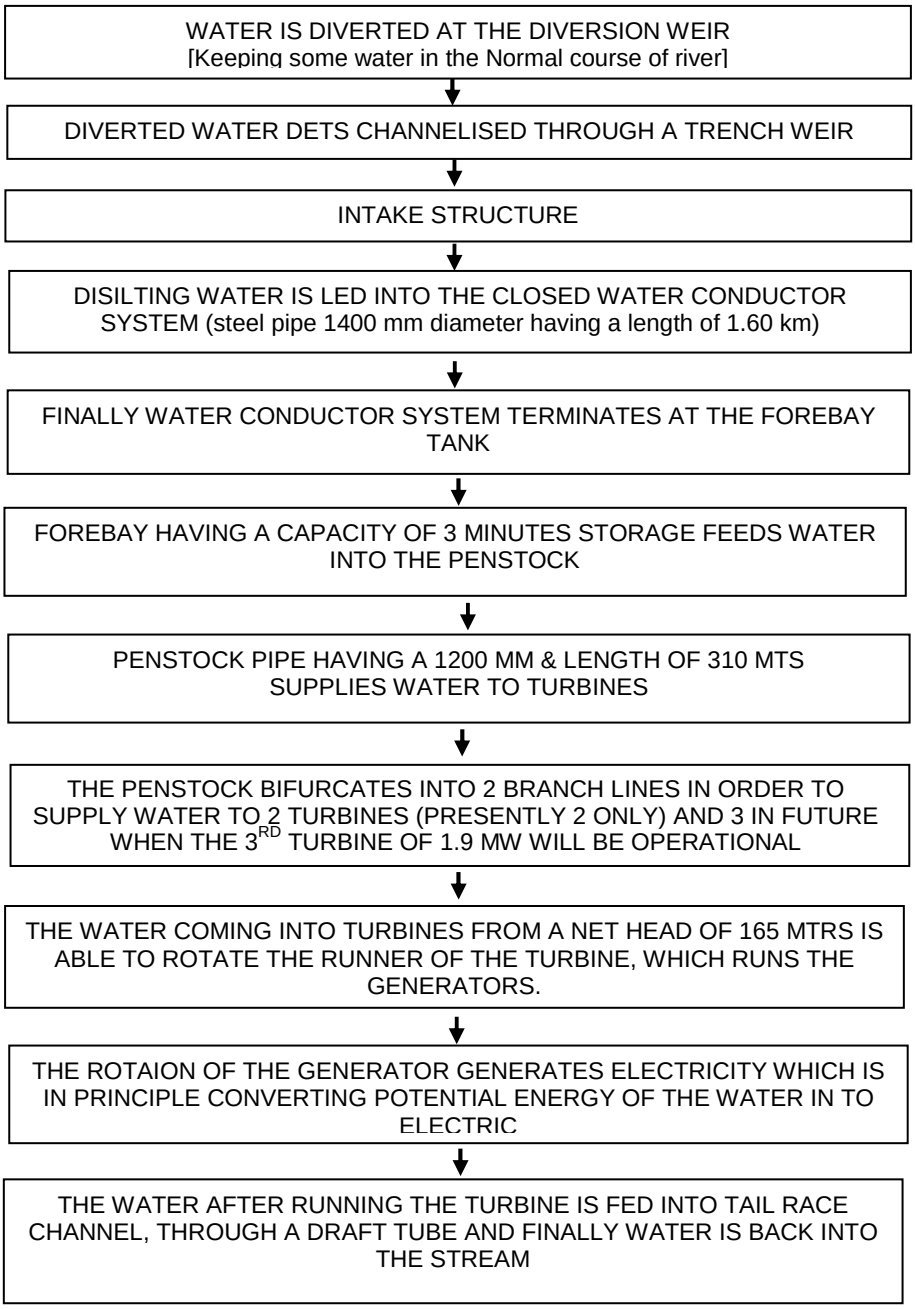
The Baragran HEP has a potential of producing 4.9 MW power against the available gross head of 170 m and discharge of 2.7 m^3/s approx. At present Baragran HEP has installation of two 1.5 MW Horizontal Francis machines and an additional 1.9 MW is to be installed based upon the optimised plant capacity of 4.9 MW derived from the power potential studies.

At present Baragran HEP has installation of 2 X 1.5 MW Horizontal Francis turbines and an additional 1.9 MW is to be installed based upon the optimised plant capacity of 4.9 MW derived from the power potential studies.

Evacuation of power:

The generated power from the project activity at 6.6 kV is stepped up to 33 kV by generator transformers and carried through 33 kV S/C transmission line to the nearest Himachal Pradesh State Electricity Board sub-station.
There is no technology transfer from other countries involved in the project activity.

FLOW CHART OF PRODUCTION



A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
INDIA (host Party)	Private entity: KKK Hydro Power Limited	NO
Switzerland	Private entity : Bunge Emissions Fund Limited	NO

A.5. Public funding of project activity

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No public funding is involved in the project activity. The resources of the implementation have been organized by the investor through in house equity and debt from financial institution through equity debt structuring.

A.6. History of project activity

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The project activity has been registered with UNFCCC on 29/10/2008 and the project registration number is 1253. The project opted for the renewable crediting period valid and the duration of the first crediting period is from 29/10/2008 – 28/10/2015.

Total emission reductions achieved are as under first crediting period (29/10/2008 – 28/10/2015):-

Monitoring Period	CER (tCO_2e)
MP07 : From 01/01/2015 to 28/10/2015	21,549
MP06 : From 01/01/2014 to 31/12/2014	20,744
MP05 : From 01/01/2013 to 31/12/2013	21,982
MP04 : From 01/01/2012 to 31/12/2012	23,460
MP03 : From 01/01/2011 to 31/12/2011	25,139
MP02 : From 01/01/2010 to 31/12/2010	23,869
MP01 : From 29/10/2008 to 31/12/2009	20,462

The duration of the second renewal crediting period is from 29/10/2015 to 28/10/2022, which has renewal date of 08/07/2016 as mentioned in UNFCCC project website.

Total emission reductions achieved are as under second crediting period (29/10/2015 – 28/10/2022):-

Monitoring Period	CER (tCO_2e)
MP01 : From 29/10/2015 to 31/10/2016	24,144

A.7. Debundling

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According to the Appendix C of the Simplified Modalities & Procedures for small scale CDM project activities; this small scale project is not a part of the large emission-reduction project, i.e. not a debundled component of the larger project or program, given that this is unique CDM project proposed by the project developer.

This project activity is not a debundled component of a larger project activity neither is a project activity registered nor there is an application to register another small scale CDM project activity:

- from the same project participant
- in the same project category and technology/measure and
- registered within the previous 2 years, and
- whose project boundary is within 1 km of project boundary of the proposed small scale activity at the closest point

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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Title of approved baseline methodology: Grid Connected Renewable Electricity Generation

Reference of the Approved Baseline Methodology: Category I.D - Renewable Energy Projects – Version 18 of AMS – I.D., Sectoral Scope 1, of the Appendix B of Simplified Modalities and Procedures (M & P) of Small Scale CDM Project Activities.

The following tools and guidelines are used in this document:

1. Tool to calculate the emission factor for an electricity system – Version 05.0.0, EB 87 annex 9
2. Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1, EB 66 annex 47
3. Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, Version 02". EB 41 annex 11

B.2. Applicability of methodologies and standardized baselines

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In accordance with the Appendix B of the simplified M&P for small scale CDM project activity indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. As per this document the project activity falls under Type – I and Category I.D. – Renewable electricity generation for a grid and applied approved small scale methodology AMS ID, version 18:

Paragraph no.	Applicability Criteria	Project Scenario
2	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (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 project is a small hydro project hence applicable for this category. The generated energy is supplied to HPSEB gird, which is a part of NEWNE regional grid which is dominated by fossil fuel based power generating sources. The project activity therefore meets this applicability requirement (a).
3	As per Appendix table 1 of AMS.I D version 18 is applicable for following project types: (a) Project supplies electricity to	The project activity is a renewable energy generation unit based on hydro source. The generated energy is supplied to HPSEB grid, which is a part of NEWNE regional grid

	a national/regional grid (b) Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)	which is dominated by fossil fuel based power generating sources. The project activity therefore meets this applicability requirement (a).
4	This methodology is applicable to project activities that (a) install a Greenfield plant); (b) involve a capacity addition in (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s); or (d) Involve a rehabilitation of (an) existing plants(s)/unit(s); or (e) involve a replacement of (an) existing plant (s).	This project activity is a green field project. There was no power plant operating at the site prior to implementation of this project activity. Thus, the project activity therefore meets this applicability requirement (a).
5	Hydro power plants with reservoirs 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, 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/m^2; • 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/m^2.	The project activity is a run-of-the-river development envisaging utilization of surplus water available in Sanjoin nala. Hence, the applicability criterion is not applicable to project activity as there is no reservoir for project activity.
6	If the unit new 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 unit new co-fires (non-) renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	There is neither non-renewable component added nor co - fixing is required for the proposed project activity. The renewable project capacity is 4.9 MW, well below the limit of 15 MW. Hence, the project activity meets this applicability criterion.
7	Combined heat and power (co-generation) systems are not eligible under this category.	The project activity is a small hydro power project and not a co-generation system. Hence, this applicability requirement is not relevant.
8	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	This is not relevant to the project activity as it does not involve any addition of renewable energy generation units at existing renewable energy power generation facility.

	by the project should be lower than 15 MW and should be physically distinct[1] from the existing units.	
9	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement unit shall not exceed the limit of 15 MW.	This is not relevant to the project activity since the project activity does not involve any retrofitting or modification of an existing facility for renewable energy generation.
10	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	This is not relevant to the project activity since the project activity a small hydro power project.
11	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	This is not relevant to the project activity since the project activity a small hydro power project.

From the above table, it is evident that the project activity meets all the applicability conditions of the approved small scale methodology AMS-I.D. (version 18) - Grid connected renewable electricity generation.

The methodology requires the project-monitoring plan to consist of metering the electricity generated by the renewable technology. In order to monitor the mitigation of GHG due to the project activity, the total energy exported and imported need to be measured. The net energy supplied to grid (difference of energy exported and imported) by the project activity multiplied by emission factor for Northern Region Grid, would form the baseline for the project activity.

GHG SOURCES

Direct on-site emissions

There would be no direct on-site emissions after implementation of the project activity since it is a run-of river hydropower project without any storage of water.

[1] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Direct off-site emission

Also there would be no direct off-site emissions after implementation of the project activity since it doesn't involve any transportation of fuel.

Indirect on-site emission

The indirect on-site GHG source is the consumption of energy and the emission of GHGs involved in the construction of project activity.

Considering the life of the project activity and the emissions to be avoided in the life span of 30 years, emission from above-mentioned source is too small and hence neglected.

No other indirect on-site emissions are anticipated from project activity.

Indirect off-site emissions

The indirect off-site emissions would include GHG emissions resulting from the erection of the HT lines from the point of generation to the nearest HT lines.

Considering the life of the power plant and the emissions to be avoided in the life span of 30 years, emissions from this source is also too small and hence neglected.

B.3. Project boundary, sources and greenhouse gases (GHGs)

>>

As per Paragraph 18 of the small-scale baseline methodology AMS-I.D., version 18: Grid connected renewable electricity generation “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.”

For the project activity the project boundary is from the trench type diversion weir to the point of power supply to nearest sub-station where the project participant has a full control. Thus, boundary covers diversion weir, intake chamber, desilting chamber, diversion channel, forebay, penstock, powerhouse HT lines and all other accessory equipments. However, for the purpose of calculation of baseline emissions, northern grid is included in the system boundary as outlined below –

Source		GHG	Included?	Justification/Explanation
Baseline	Grid Electricity Generation	CO_2	Yes	Main Emission Source
		CH_4	No	Excluded for simplification. This is Conservative
		N_2O	No	Excluded for simplification. This is Conservative
Project activity	On site fossil fuel consumption due to the project activity	CO_2	No	Maybe an important emission source
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
	Combustion of waste gas for electricity generation	CO_2	No	Not applicable
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.

B.4. Establishment and description of baseline scenario

>>

Updated baseline for the second crediting period in line with the **"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Ver 03.0.1.**

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 292 of Project Standard & 49 (a) of the modalities and procedures of the clean development mechanism.

The tool stipulates the following steps to be carried out.

Step 1: ***Assess the validity of the current baseline for the next crediting period***

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The baseline scenario remains unchanged and is in compliance with all the relevant mandatory national and/or sectoral policies.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid. Thus this project activity was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. PP was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for PP within their scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 245,258.54 MW as on 31.03.2014, consisting of 168254.99 MW Thermal, 40531.41 MW Hydro and 4,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, It is evident from Table 1 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO2 emissions in the country by increased use of renewable energy sources. Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 10[2]) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission.

Table 1: Sector- wise installed capacity (MW) as on 31.03.2014 (CEA Database version 10)

Table 1: Sector- wise installed capacity (MW) as on 31.03.2014.

Sector	Hydro	Thermal				Nuclear	Renew.	Total
		Coal	Gas	Diesel	Total			
State	27482.00	53828.00	6548.32	602.61	60978.93	0.00	3803.67	92264.60
Central	10355.41	45925.01	7065.53	0.00	52990.54	4780.00	0.00	68125.95
Private	2694.00	45520.38	8168.00	597.14	54285.52	0.00	27888.47	84867.99
All India	40531.41	145273.39	21781.85	1199.75	168254.99	4780.00	31692.14	245258.54

Note: These capacities are not identical with those listed in the Excel database, because the database excludes renewable, few small diesel and steam units.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) ***or an investment is the most likely scenario for the crediting period for which renewal is requested***

[2] http://www.cea.nic.in/

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. Therefore this condition is not applicable to the project activity.

Step 1.4: Assessment of the validity of the data and parameters

This step stipulates that *"Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity."*

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters

As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version available at the time of PDD submission for renewal.

In line with the paragraph 13.9.1 of the Project Standard version 9, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity

The Government of India enacted the Electricity Act in the year 2003[3] to harmonize and rationalize the provisions in the then existing laws. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. With the Enactment of the act, the then existing laws viz, The Indian Electricity Act 1910, The Electricity Supply Act, 1948 and The Electricity Regulatory Commissions Act, 1998 were repealed. The Electricity Act 2003 was in force at the time of the completion of the baseline study for the registered PDD.

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy[4] on 12th February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

In addition to the above policies, State Electricity Regulatory Commissions (SERCs) have announced preferential tariffs and Indian Renewable Energy Development Agency (IREDA) provides term loan assistance towards establishing biomass power projects. All these fiscal and financial incentives were in force at the time of completion of the baseline study for the registered PDD of the project activity and still continue to exist.

[3] http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf
[4] http://powermin.nic.in/indian_electricity_scenario/national_electricity_policy.htm

However, in spite of the financial incentives given by the government to renewable power projects in India the generation from the low cost must run resources connected to the NEWNE Regional Grid has not increased to such an extent that this would lead to more than 50% contribution from the low cost must run resources towards the total generation from the NEWNE Regional Grid.

The approved consolidated baseline methodology, AMS-I.D., (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "Tool to calculate the emission factor for an electricity system" (version 05.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the *Project Standard para 13.9.1,* national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario .Hence the baseline scenario as applied for the present project activity remains justified.

As per AMS-I.D., (Version 18), paragraph 22, Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,\,y} * EF_{grid,\,y} \qquad (1)$$

Where:

BE_y : Baseline Emissions in year y; t CO_2

$EG_{PJ,\,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EF_{grid,\,y}$: Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

The Emission Factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in tCO2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used."

The approach proposed in the "Option (a)" i.e. "Combined Margin" has been used for ascertaining Baseline Emission Reductions. The operating margin and the build margin emission factor have been considered from the information (Baseline Carbon Dioxide Emission Database -Version 10, Dated: December 2014)[5] published by the Central Electricity Authority (CEA), Ministry of Power,

[5] Reference: http://www.cea.nic.in/

Govt. of India which have been computed according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system" version 05.0.

The baseline scenario has been identified as per the combined margin (CM) approaches which consists of operating margin (OM) and build margin (BM) factors as described in this section.

STEP 1. Identify the relevant electricity System:

The Indian power system is divided into two independent grids, namely new Integrated Northern, Eastern, Western, and North-Eastern regional grid (NEWNE) and the Southern Grid. This project activity is located at Himachal Pradesh which comes under NEWNE Grid. In the proposed baseline, NEWNE Grid has been used as the reference grid system for estimating the baseline emission.

GRID	NEWNE Grid				Southern Grid
	Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
STATES	Chandigarh Delhi Haryana Himachal Pradesh Jammu & Kashmir Punjab Rajasthan Uttar Pradesh Uttarakhand	Bihar Jharkhand Orissa West Bengal Sikkim Andaman-Nicobar	Chhattisgarh Gujarat Daman & Diu Dadar & Nagar Haveli **Madhya Pradesh** Maharashtra Goa	Arunachal Pradesh Assam Manipur Meghalaya Mizoram Nagaland Tripura	Andhra Pradesh Karnataka Kerala Tamil Nadu Pondicherry Lakshadweep

STEP 2. Choose Whether to Include Off-Grid Power Plants in the Project Electricity System (Optional):

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation

Project participant has chosen option I to include only grid power plants in the calculation.

STEP 3. Select a method to Determine the Operating Margin (OM)

As per the "tool to calculate the emission factor for an electricity system", version 05.0.0, "the operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity."

Further, the OM is to be determined based upon the following methods

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

The simple OM method (option a) can only be used if low cost/must run resources[6] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

In the context of the present project activity simple OM has been considered since the contribution of low cost must run resources in the NEWNE regional grid mix amongst the five most recent years generation of the NEWNE regional grid mix is less than 50% of total grid generation. Hence, the use of simple operating margin method towards formulation the baseline scenario remains justified. The ex-ante option has been chosen where in a 3 year generation weighted average, based on the most recent data would be calculated and is fixed for the entire crediting period.

The Simple OM factor is calculated as under in Step 4.

Step 4: Calculate the Operating Margin Emission Factor According to the Selected Method

As per Step 3 of the 'tool to determine the emission factor of an electricity system', the simple OM emission factor can be calculated using the ex-ante option which states that for calculation of OM '*A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period'.*

In this regard, the simple OM emission factor has been sourced from the most recent data available at the time of submission of the PDD for renewal and has **therefore been fixed for this second crediting period** (see Appendix 3 & 4 for data related to operating margin in NEWNE grid).

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;

or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 05.0.0". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

As per 'Tool to calculate the emission factor for an electricity system', Option A ("Based on the net electricity generation and a CO_2 emission factor of each power unit") is used to calculate simple

[6] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

OM emission factor. Where Option A is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$EF_{grid,OMsimple,y} = \Sigma (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$

Where:

$EF_{grid,OMsimple,y}$	Simple operating 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	All power units serving the grid in year y except low-cost / must-run power units
y	The relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database[7] (Version 10.0, Dec 2014) for the last three years is as follows.

CO_2 emission factor for simple OM (tCO_2/MWh) (incl. Imports)			
Grid	**2011-12**	**2012-13**	**2013-14**
NEWNE	0.9699	0.9919	0.9953

The net electricity generation ($EG_{m,y}$) data, available under the CEA database[8] (Version 10) December 2014, of all generating power plants (not including low-cost / must-run power plants / units) for the last three year has been taken from the database.

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PDD for validation, i.e. 2011-12, 2012-13 and 2013-14 for NEWNE grid is:

The ex-ante OM value obtained is 0.9857 tCO_2/MWh

Step 5: Calculate the Build Margin (BM) Emission Factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor 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. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if

[7] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

[8] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The project participant has chosen Option 1 for vintage of the data

As per the CEA CO_2 Baseline Database version 10, the BM for the 2013-14 (most recent year) for NEWNE grid has been calculated to be $EF_{grid, BM,y}$ = 0.9495 tCO_2e/MWh[9].

Step 6: Calculate the Combined Margin Emissions Factor

Combined Margin has been used for ascertaining Baseline Emission Reductions. The combined margin emission factor consists of two components i.e. the operating margin and the build margin. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the simple operating margin and build margin emission factor for the southern regional grid. According to 'Tool to calculate the emission factor an electricity system' version 4.0.0, the combined margin emission factor is calculated as follows:

The weighted average CM method (option A) is preferred for calculation of combined margin emission factor.

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

Where:

$EF_{grid,OM,y}$: Operating Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{OM} : Weighting of operating margin emission factor (%)
$EF_{grid,BM,y}$: Build Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{BM} : Weighting of build margin emission factor (%)

The combined margin emission factor has been derived from the simple operating margin and build margin emission factors after considering/ factoring the weights of 0.25 and 0.75 for operating margin (OM) and build margin (BM) emission factors respectively relevant to the hydro power generation project activities as per Para 84 (b) the 'Tool to calculate the emission factor for an electricity system (Version 05)

Combined Margin (CM) in tCO_2/MWh for NEWNE regional grid is

$EF_{CO2,grid, y}$ **=** 0.25 x Average of OM for last 3 years + 0.75 x BM
= 0.25 x 0.9857 + 0.75 x 0.9495
= 0.9586

Hence combined margin emission factor for the NEWNE grid ($EF_{CO2,grid, y}$) is 0.9586 tCO_2/MWh.

B.5. Demonstration of additionality

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The description and explanation on 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 is given below.

The installed capacities has increased from mere 1,713 MW in 1950 to 124,287 MW as on 31.03.06 consisting of 82,411 MW Thermal, 32,326 MW Hydro, 3,360 MW Nuclear. Region wise details of installed capacity are as shown below:

[9] Refer ER sheet for detailed calculation.

Region	Thermal				Hydro	Nuclear	Renewable	**Total**
	Coal	Gas	Diesel	Total				
Northern	**17592.50**	**3213.19**	**14.99**	**20820.68**	**11061.88**	**1180.00**	**694.59**	**33757.15**
Western	20941.50	5080.72	17.48	26039.70	6681.33	1300.00	1098.83	**35119.86**
Southern	15992.50	3434.50	939.32	20366.32	10967.71	880.00	4233.49	**36447.52**
Eastern	13662.38	190.00	17.20	13869.58	2496.53	0.00	111.67	**16477.78**
North Eastern	330.00	771.50	142.74	1244.24	1113.07	0.00	46.86	**2404.17**
Island	0	0.00	70.02	70.02	5.25	0.00	5.42	**80.69**
All India	**68518.88**	**12689.91**	**1201.75**	**82410.54**	**32325.77**	**3360.00**	**6190.86**	**124287.17**[6]

It is evident from the above table that the installed capacity is predominantly coal based and therefore is major source of carbon dioxide emissions from India. Hence, there exists scope for reducing the CO_2 emissions from the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

In India electricity is a concurrent subject between the state and the central governments. The perspective planning, monitoring of implementation of power projects is the responsibility of Ministry of Power, Government of India. At the state level the state utilities or state electricity boards (SEBs) are responsible for supply, transmission and distribution of power. With power sector reforms there have been unbundling and privatisation of this sector in many states. Many of the state utilities are engaged in power generation also. In addition, there are different central/public sector organizations involved in generation like National Thermal Power Corporation (NTPC), National Hydro Power Corporation (NHPC), etc. in transmission e.g. Power Grid Corporation of India Ltd. (PGCIL) and in financing e.g. Power Finance Corporation Ltd. (PFC)

The management of generation and supply of power within the state and regional grid is undertaken by the state load dispatch centre (SLDC) and regional grid despatch centres (RLDC). Different states within the regional grid meet the demand from their own generation facilities plus generation by power plants owned by the central sector i.e. NTPC and NHPC etc. Specific quota is allocated to different states from the central sector power plants. Depending on the demand and generation there are exports and imports of power within different states in the regional grid. Thus there is an exchange of power among states in the regional grid. Similarly there exists imports and export of power between regional grids.
The project activity falls in Himachal Pradesh, which is a part of the Northern grid, is largely dependent on thermal generation. Commissioning of this project will therefore provide clean electricity to the northern grid of the country, which would have otherwise never been generated. The northern grid is currently dominated by thermal sources of energy and during the current five-year and next five-year plan; the following implementations are under execution for capacity addition in the northern grid.

Type	10th Five Year Plan[7]

Hydro	8974 MW
Thermal	10436 MW
Nuclear	Nil
Renewable	Through private sector, thus not planned (less than 200 MW)

Thermal plants perform at a higher PLF whereas the generation of electricity from hydroelectric projects depends upon the availability of water in the river. Thus even if about 46% of the new installations will be from hydro, their generation contribution would be less than 30% of the total generation added into the grid.

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in appendix B may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in attachment A of Appendix B.

The implementation of the hydropower based project activity is voluntary step undertaken by KKK Hydro-Power with no direct or indirect mandate by law.

The main driving forces to this 'Climate change initiative' have been:

- ✓ GHG reduction
- ✓ The rural development of the region by making roads and creating job opportunities for the local people demonstrating of other entrepreneurs the untapped potential of generating clean power from small rivulets of water.

However, the project participant was aware of the various barriers associated to project implementation. But it is felt that the availability of carbon financing against a sale consideration of carbon credits generate due to project activity would help to overcome these barriers. Some of the key barriers are discussed below:
Assessment of project additionality - The additionality aspects of the project are discussed below in accordance with Attachment A of Appendix B of the simplified M & P for small scale CDM project activities.

Investment barrier

a. High capital cost involvement – The high initial cost related financial risk impacts significantly towards this kind of small scale hydro power plants, which are subject to face larger hydrological and technological risk. The project calls for an investment of INR 254.7 million (140.10 million for 3.0MW + Rs. 114.6 Million for 1.9 MW), which is high in comparison with the costs required for conventional power projects. Though the operating cost for small hydropower projects is low, but arranging adequate financing sources to the extent of the above mentioned magnitude is intricate, due to the obvious risk due to low plant load factor, irregular monsoons, uncertainty of the weather along with risks associated with hydropower projects.
The 3 MW project was commissioned with a debt-equity ratio of 77:23, with the term loan of Rs.1237.50 lakhs and Rs.150.0 Lakhs from IREDA & Canara Bank respectively and with equity investment of Rs.412.50 Lakhs by the promoters/associate concerns. Against the term loans taken from the financial institutions KKK Hydro Power Limited is liable to pay interest on the principal amount of loan at the rate of 13.75% p.a. exclusive of Interest Tax to IREDA and

13.25% p.a. to Canara Bank. Total cost of the project (3 MW) as on 31.03.06 has been increased to Rs. 1870.05 Lakhs. The cost of 1.9 MW project is Rs.1146 Lakhs. The term loan request applied to IREDA for a loan of Rs.802 Lakhs, as 70% of the targeted project cost i.e. Rs.1146 Lakhs for our 1.9 MW up gradation project.

b. Increasing Cost overheads due to operational risk – As the project activity is located in the hilly terrain of Himachal Pradesh, the difficulties and additional cost have been envisaged regarding transportation of construction material and equipments, developing infrastructure (such as access road, pen stock etc.), construction and maintenance of transmission line for power evacuation. This aspect makes a significant barrier for conceiving small scale hydro power project.

c. Risk associated with low return on interest – As the main revenue source for the project activity has been envisaged mainly through the sale of power to the State Grid, but the risk related to the payment option towards power tariff according to the Power Purchase Agreement signed between the project participant and Himachal Pradesh State Electricity Board (Article 6 Sale & Purchase of The Energy), paragraph 6.2 (Tariff for Net Saleable Energy), it was clear that the Board shall pay KKKHPL for the net saleable energy delivered at the interconnection point at a rate of Rs. 2.50 per kilowatt-hour and the rate is firm and fixed and shall not be changed due to any reason.

The Internal Rate of Return (IRR) analysis has been prepared to ascertain the return on project investment have been derived as under:

Project IRR (Without CDM Benefit) –

For Existing 3.0 MW Project	For Expanded 1.9 MW Project	For the total 4.9 MW
12.18%	12.22%	12.19%

Project IRR (With CDM Benefit) –

For Existing 3.0 MW Project	For Expanded 1.9 MW Project	For the total 4.9 MW
16.56%	15.33%	16.11%

Equity IRR (Without CDM Benefit) -

For Existing 3.0 MW Project	For Expanded 1.9 MW Project	For the total 4.9 MW
14.00%	11.61%	13.00%

Equity IRR (With CDM Benefit) -

For Existing 3.0 MW Project	For Expanded 1.9 MW Project	For the total 4.9 MW
24.91%	17.35%	21.51%

Investment Benchmark – IRR comparative chart without CDM benefits:

For 3.0 MW				
Comparison 1		**Comparison 2**		
Local Commercial Lending Rate	**Project IRR**	**Expected return on Equity**	**Equity IRR (4)**	**IRR On Actual Basis (5)**
((1237.5*0.1375) + (150*0.1325))/1387.5 = 13.70%	12.18%	15.69%	14.00%	7.3

For 1.9 MW				
Comparison 1		**Comparison 2**		
Local Commercial Lending Rate	**Project IRR**	**Expected return on Equity**	**Equity IRR (4)**	**IRR On Actual Basis (5)**
13.70%	12.22%	14.00%	11.61%	Not Available

For 4.9 MW (3.0 MW Being expanded to 4.9 MW)				
Comparison 1		**Comparison 2**		
Local Commercial Lending Rate	**Project IRR**	**Expected return on Equity**	**Equity IRR (4)**	**IRR On Actual Basis (5)**
13.70%	12.19%	((0.1569*3) + (0.14*1.9))/4.9 = 15.03%	13.00%	Not Available

1. Local commercial lending rate for 3.0 MW is based on sanctioned letters of IREDA * CANARA BANK available with PP as well as DOE. For 1.9 MW draw down figure have been used. Amount of loan taken is mentioned at para 3 of page no. 19 of PDD.

2. Project IRR is based on CA certificate dt. 02.07.2007 (Further based on DPR) available with PP, DOE & UNFCCC

3. Expected return on equity is based on 200 basis points above the local commercial lending rate for 3.0 MW and as per DPR for 1.9 MW

4. Equity IRR is based on CA certificate dt. 06.11.2007 available with PP, DOE & UNFCCC.

5. IRR on actual basis is available only for 3.0 MW as 1.9 MW has not yet commence. IRR on actual basis is based on CA certificated dt. 06.11.2007 (which is based on Annual Audited Financial Statements for the year 2004-05 to 2006-07. Production for 3.0 MW commenced in August 2004)

Justification on the assumed 2% risk premium:

In reference to “Baragaran Hydro Electric Project 3.0MW (being expanded to 4.9MW)” (1253), the DPR for 3.0 MW nowhere talks about Benchmark Equity Internal Rate of Return. In absence of reference in DPR, benchmark Equity IRR has been assumed at 15.69% (2%

above Local Commercial Lending Rate).

Risk Premium to calculate the expected return on equity is based on conservative approach. This is justified on the basis of a study carried by Jayanth R. Varma and Samir K. Barua of IIMA Working Paper June 2006 (A First Cut Estimate of the Equity Risk Premium in India; W.P. No. 2006-06-04; Indian Institute of Management, Ahmedabad).

Conservative Approach:

"*We estimate the equity risk premium in India using data for the last 25 years. We address the shortcomings of existing indices by constructing our own total return index for the 1980s and early 1990s. We use our estimates of the extent of financial repression during this period to construct a series of the risk free rate in India going back to the early 1980s. We find that the equity risk premium is about 8½% on a geometric mean basis and about 12% on an arithmetic mean basis.*

We therefore compute the estimates of the risk premium using both these averaging methods. We also divide the sample period into the pre reform and post reform sub periods (using mid 1991 as the cut off date) and present the results for these two sub periods as well. The arithmetic mean of the market return has been obtained by computing the average daily return and annualizing this into an equivalent annual return.

Time Period	*Geometric Mean*			*Arithmetic Mean*		
	Risk Free Rate	*Market Return*	*Risk Premium*	*Risk Free Rate*	*Market Return*	*Risk Premium*
Pre mid 91	*12.02%*	*20.98%*	*8.96%*	*12.02 %*	*23.23%*	*11.21%*
Post mid 91	*9.47%*	*18.05%*	*8.58%*	*9.51%*	*22.96%*	*13.45%*

(Source : http://www.iimahd.ernet.in/~jrvarma/papers/WP2006-06-04.pdf)

Conclusion

In reference to above, it is clear that equity risk premium in India was 8.58% during post mid 1991 whereas project participant has considered equity risk premium of 2.00%, which is conservative.

On the basis of the Comparison Chart mentioned above, this is very much clear that given the IRR Benchmark comparison it can be concluded that neither investment would have been possible without CDM revenues.

Because of non escalation clause of power tariff in Power Purchase Agreement for a period of 30 years and envisaging operational risk (cost overruns) of the project activity due to its high terrain location financial closure was achieved with great difficulty.

The financial analysis of the entire project indicates the Equity Internal Rate of Return is 13.00%, which is by, low every standard (considering emissions reductions the inflation rate of 6% in case of India). The CDM revenue by sale of will raise the Equity IRR to respectable levels helping in the repayment of loan.

Barrier due to prevailing practice

The large and medium scale power projects hugely dominate the Indian power sector and the same is true for the Northern Grid. The private investors, due to apparent advantages of assured return on investment, economies of scale and easy availability of finances are attracted towards

the large and medium fossil fuel based projects and hence hydropower is hugely ignored. The trend is evident from a host of planned projects that comprises mostly large-scale fossil fuel based power generation projects.
As per table 1 shown on Page No. 2 of chapter 1 (Background and Objective) of CO_2 Baseline database for the Indian Power Sector User Guide Version 1.1 December, 2006 of Central Electricity Authority, Ministry of Power, Govt. of India, the contribution of coal and gas based power generation is more than 67% in the grid.

In accordance with Ministry of Power, Government of India[8]; India has the total power generation installed capacity of 1,32,110.21 MW including only 26.2% hydro and renewable 5.9 %, which establish the current scenario of power generation mix in India. According to Central Electricity Authority[9], Ministry of Power, Government of India, as on 31.03.2006, the hydro-electric schemes in operation account for only 19.08% and those under execution are 5.61% of the total potential. Thus, the bulk of the potential (75.32%) remains yet to be developed. According to the Ministry of New & Renewable Energy, Government of India, (tabulated as follows)[10] out of total 525.72 MW installed capacity of SHP in Northern region Himachal Pradesh has only 22% of total project installed and 6.8% of total projects under implementation.

Small Hydro Power Project	**Identified Capacity**	**Projects Installed** (as on 31.12.05)	**Projects under implementation** (as on 31.12.05)
Himachal Pradesh	1624.78 MW	119.08 MW	52.50 MW
Northern Region (Total)	4699.916 MW	525.72 MW	112.77 MW
India (Total)	10106.02 MW	1747.98 MW	585.13 MW

According to the Ministry of New & Renewable Energy, Government of India[11] so far, private sector SHP projects with an aggregate capacity of about only 400 MW have been set up mainly in Andhra Pradesh, Karnataka, Himachal Pradesh, Punjab, Uttaranchal and Maharashtra state of India out of total estimated potential of 15,000 MW for the country. Through the existing public sector facts and figures it can be established that the private sector small hydro power project development is not the prevailing practice in state of Himachal Pradesh.

Hence, the proposed project is additional and not the same as the baseline scenario and would not have occurred without considering CDM revenue. CDM revenues are expected to facilitate the project activity to overcome the project barrier as envisaged and leverage the project economics in case of any unforeseen outages, which resulted due to the above uncertainties.

The management of KKK Hydro Power Ltd. decided to incorporate the scope of carbon credit revenue for initial 3 MW project capacity during early project planning stage i.e. 15th July 2000 and further during discussion regarding identified scope for project capacity expansion of 1.9 MW, carbon credit revenue has been also considered for risk mitigation of project investment as the proceedings of the earlier decision and the board of the company decided to consider carbon credit revenue for the project financing plan on 23rd April 2004. Afterwards due to delay towards implementation of initial 3 MW project capacity and non availability of required knowledge support to proceed in to the Clean Development Mechanism project modalities, the management of the company decided to consider the initial 3 MW project capacity and planned capacity expansion of 1.9 MW at the same project site as the single entity to go ahead with the implementation of the CDM project modalities and serious consideration of carbon credit revenue in August 2004.

Inspite of above discussed barriers; KKKHPL was one such entrepreneur to initiate this GHG abatement project under Clean Development Mechanism. KKKHPL's success would depend on

securing the proposed carbon finance and it would definitely encourage other entrepreneurs to come up with similar project activities contributing further towards GHG emission reduction through the huge untapped small hydro-power potential.

In the absence of the project participant's initiative to implement the project, the regional grid mix dominated by fossil fuel based power plants would generate the equivalent. With the implementation of the project, of clean electricity would be generated over a period of 7 years.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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According to the para 43 of AMS-I.D. (version 18), the Emission Reductions for the project activity will be calculated using the following formula:

$$\mathbf{ER_y = BE_y - PE_y - LE_y} \quad \text{.....(2)}$$

Where,

ER_y = Emission Reductions during the year y in tCO_{2e}
BE_y = Baseline Emissions during the year y in tCO_{2e}
PE_y = Project Emissions during the year y in tCO_{2e}
LE_y = Leakage Emissions during the year y in tCO_{2e}

A. Baseline Emissions: As per para 22 of AMS-I.D. (version 18), the baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,\,y} * EF_{grid,\,y} \quad (1)$$

Where:

BE_y : Baseline Emissions in year y; t CO_2

$EG_{PJ,\,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EF_{grid,\,y}$: Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

$$\mathbf{BE_y = EG_{PJ,y} * EF_{grid,y}} \quad \text{.....(3)}$$

Where,

$\mathbf{BE_y}$ = Baseline Emissions in year y (tCO2)

As per para 26 of AMS-I D ver 18, $\mathbf{EG_{PJ,y}}$ = $EG_{PJ,facility,y}$ = Quantity of net electricity supplied by the project plant/unit to the grid in year y (MWh).

(The net electricity export to the grid is the difference between the quantities of the grid electricity export and the import.)

$\mathbf{EF_{grid,\,y}}$= CO2 emission factor of the grid in year *y* (t CO2/MWh)

(Baseline emission factor for the grid (considering Combined Margin approach). NEWNE regional grid has been considered for this project activity.)

B. Project Emissions:

According to para 39 of AMS-I.D. (version 18), *for most renewable energy project activities, PEy = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.*

- *Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)*

- *Emissions from water reservoirs of hydro power plants"*

The project activity is not a biomass project, neither a geothermal application and nor it is a water reservoir based hydro power project. This is a first of its kind small hydro project; therefore no project emissions are applicable to the proposed project activity.

However, as per paragraph 40 of AMS-I.D. (version 18), CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion[10]".

As there is a small capacity DG set available at the site as backup arrangement during start up or as a failsafe option. Therefore, the emission due to on-site consumption of fossil fuel shall be calculated as per the "Tool to Calculate project or leakage CO_2 emissions from fossil fuel combustion, Version 02" a project emission; (calculated in the section B.6.3 of the PDD),

Thus,

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$ - Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);

$FC_{i,j,y}$ - Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);

$COEF_{i,y}$ - Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

I - Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{i,,y}$ will be calculated based on net calorific value and CO_2 emission factor of fuel type i, as mentioned in option B (equation 4) of 'Tool to calculate project or leakage CO2 emissions from fossil fuel combustion' (version 2).

C. Leakage Emissions: According to the AMS-I.D (version 18), paragraph 42, guidance on leakage is provided for biomass project only but the project activity is first of its kind small hydro project. Hence, no leakage emission from this project activity has been considered.

D. Emission Reductions: The emission reductions of the project activity are calculated as the difference between the baseline emissions and the project emissions as according to equation no 9 as per paragraph 43 of AMS I.D. (version 18)

$ER_y = (BE_y – PE_y - L_y)$

where,

[10] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

ER_y = emission reductions for the project activity in tonnes of CO_2e
BE_y = Baseline emissions in tonnes of CO_2 e
PE_y = Project emissions in tonnes of CO_2 e
L_y = Leakage emissions in tonnes of CO_2 e

B.6.2. Data and parameters fixed ex ante

Data/Parameter	EF_y
Data unit	tCO_2/ MWh
Description	Combined Margin CO_2 emission factor of the NEWNE regional grid
Source of data	CO2 Baseline Database for the Indian Power Sector Version 10.0, Dated 16 December 2014 (Combined Margin Emission Factor for Northern Regional Grid) published by Central Electric Authority (CEA), India http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf
Value(s) applied	0.9586
Choice of data or measurement methods and procedures	CEA has estimated the simple operating margin and build margin emission factor for the NEWNE regional grid. For calculating the CO_2 emission factor as per combined margin method for the renewable power generation project activities in the first and subsequent crediting periods, the weights of 0.25 for operating margin and 0.75 for build margin have been considered as 'Tool to calculate the emission factor for an electricity system' (Version 04)
Purpose of data	Calculation of Baseline Emission
Additional comment	The emission factor has been fixed for the second crediting period.

B.6.3. Ex ante calculation of emission reductions

>>

Baseline Emissions: Baseline emissions due to the project activity are calculated as follow –

Baseline Emissions (**BE_y**) = CO2 emission factor of the grid (**EF_y**) x Power exported to the Northern Regional grid by the project activity per year (**EG_y)**

Where,

EF_y has been taken from CEA CO2 Baseline Database for the Indian Power Sector, Version 10.0 for NEWNE grid system of India as applicable.
EG_y has been considered as per the Detailed Project Report for the project activity.

2. Project Emissions: As the project activity is a run-off the river small hydro power plant, thus the possibility of any kind of GHG emissions within the project boundary (**PE_y**) has been considered as 'Zero'.

3. **Leakage:** As described under Appendix B of the Simplified M & P for small-scale CDM project activities, Category I.D, leakage estimation is only required if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. In case of this project activity all the energy generating equipments have been procured brand new from respective equipment suppliers. Thus the leakage emissions (**L_y**) for the project activity have been considered as 'Zero'. Also, according to the AMS-I.D (version 18), paragraph 42, guidance on leakage is provided for biomass project only but the project activity is small hydro project. Hence, no leakage emission from this project activity has been considered.

Hence, $L_y = 0$

4. Emission reductions due to project activity: The following formula is used to determine

emission reductions –

$$ER_y = (BE_y - PE_y - L_y)$$

The average annual emissions reductions due to the project activity for seven years crediting period has been calculated ex-ante as 25,967 tCO_2e per annum.

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
29/10/2015 to 28/10/2016	25,967	0	0	25,967
29/10/2016 to 28/10/2017	25,967	0	0	25,967
29/10/2017 to 28/10/2018	25,967	0	0	25,967
29/10/2018 to 28/10/2019	25,967	0	0	25,967
29/10/2019 to 28/10/2020	25,967	0	0	25,967
29/10/2020 to 28/10/2021	25,967	0	0	25,967
29/10/2021 to 28/10/2022	25,967	0	0	25,967
29/10/2022 to 28/10/2023	25,967	0	0	25,967
Total	181,769	0	0	181,769
Total number of crediting years	7			
Annual average over the crediting period	25,967	0	0	25,967

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	EG_{export}
Data unit	KWh
Description	Total electrical energy exported by the project activity
Source of data	Plant records (Power Export Bills)
Value(s) applied	27.9×10^{613}
Measurement methods and procedures	The data will be recorded by Main and Check meters of reputed make installed at the Himachal Pradesh State Electricity Board (HPSEB) grid substation. The meters will be calibrated and maintained by HPSEB. Records of monthly electricity sales bills will be used as evidence for power exported to HPSEB Grid.
Monitoring frequency	Monthly
QA/QC procedures	Main and Check meters of M/s L & T Make, Model No./Type No. AC – 3 Phase 4 Wire / Type – ER 300 P. Sealed meter installed. Monitored by HP State Electricity Board. Accuracy of meters: 0.2s Frequency of calibration: Once in five year

Purpose of data	Calculation of baseline emissions
Additional comment	The power export bills can be cross checked with monthly joint meter reading report duly verified and authorised by HP State Electricity Board.

Data / Parameter	E_{import}
Data Unit	KWh
Description	Total electrical energy imported by the project activity
Source of data	Plant records (Power Export Bills)
Value(s) applied	Monthly value from Power Export Bill
Measurement methods and procedures	The data will be recorded by duly tested and sealed meter installed. The meter will be calibrated and maintained by HPSEB. Records of monthly electricity sales bills will be used as evidence for power imported from the HPSEB grid. Accuracy of meters: 0.2s Frequency of calibration: Once in five year
Monitoring frequency	Monthly
QA/QC procedures	Total electrical energy imported will be monitored by duly tested and sealed meter installed. Monitored by HP State Electricity Board.
Purpose of data	Calculation of baseline emissions
Additional comment	The power export bills can be cross checked with monthly joint meter reading report duly verified and authorised by HP State Electricity Board.

Data / Parameter	EG_y
Data Unit	KWh
Description	Net electrical energy exported by the project activity
Source of data	Plant records (Power Export Bills)
Value(s) applied	Monthly value from Power Export Bill
Measurement methods and procedures	The data will be calculated and recorded by Himachal Pradesh State Electricity Board (HPSEB). Records of monthly electricity sales bills will be used as evidence for net power exported to HPSEB grid
Monitoring frequency	Monthly
QA/QC procedures	Difference of (EG_{export}) and (E_{import}). Therefore No QC/QA is required.
Purpose of data	Calculation of baseline emissions
Additional comment	The power export bills can be cross checked with monthly joint meter reading report duly verified and authorised by HP State Electricity Board.

B.7.2. Sampling plan

>>
Not Applicable

B.7.3. Other elements of monitoring plan

>>
Key Project Parameters affecting Emission Reductions

Power Exported by the Project: The power exported by KKKHPL would be measured to the best accuracy at the nearest substation of Himachal Pradesh State Electricity Board. The parameter would substantiate the smooth operation of the power plant.

Power Imported by the Project: The power imported by KKKHPL during the lean period would also be recorded to the best accuracy. The project site is located in Kullu district of Himachal Pradesh. Especially, in winter season as the project is partially or totally unable to operate, the company may draw energy required for start up and maintenance of the project from the Himachal Pradesh State Electricity Boards system, which shall be metered at the interconnection point and adjusted against the Net Saleable Energy in corresponding month's bill.

Net Power exported to the grid: The project revenue is based on the net units exported by KKKHPL and would be measured to the best accuracy at the nearest substation of Himachal Pradesh State Electricity Board.

The general principles for monitoring above parameters are based on:

- Frequency
- Registration and reporting
- Reliability

Frequency of Monitoring

Monthly joint meter readings of main and check meters installed at interconnection point shall be taken and signed by authorised officials of KKKHPL and HPSEB at 9:00 hrs on the first day of every month. The hourly, daily & monthly log sheets are maintained in hard copies as well as in soft also.

Registration and Reporting

Records of this joint meter reading at interconnection would be maintained by KKKHPL. Monthly reports stating the generation, auxiliary consumption, and net power exports would be prepared by the shift in-charge and verified by plant manager.

Reliability

Payments to KKKHPL by HPSEB and emission reduction calculations would be based on net energy supplied by KKKHPL at interconnection point. For measuring the delivery and import of energy by KKKHPL at interconnection point, one set of main meter and check meter shall be provided by KKKHPL and HPSEB respectively at interconnection point
KKKHPL as well as HPSEB would keep requisite sets of metering equipment, duly tested/calibrated, as spares, for replacement as and when required. Main or check meter would be replaced by spare set of meter with, mutual consent of parties.

The technical details of main and check meter installed at interconnection point are :

Nomenclature	:	Electronic Trivector Energy Meter (Digital Display), Bidirectional
Model No./Type No.	:	AC – 3 Phase 4 Wire / Type – ER 300 P
Trade Mark or Make	:	M/s L & T Limited, Mysore
Serial No.	:	05390244
Voltage Ratio	:	33KV/110V
Current Ratio	:	75/1A

The main and check meter would be test checked for accuracy is once in five year in line with para 18.1.b of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf). Therefore, the main and check meter installed at the Interconnection point have five years validity. The main and check meters are installed at the interconnection point in presence of both the parties namely, KKKHPL & HPSEB. These meters are calibrated at the National Accreditation Board for Testing & Calibration Laboratories (NABL) accredited laboratory e.g. RTL Jalandhar. The check meter would be calibrated or replaced with spare tested calibrated meter, as may be necessary. The main meter would be immediately calibrated or replaced with spare tested calibrated meter, as may be

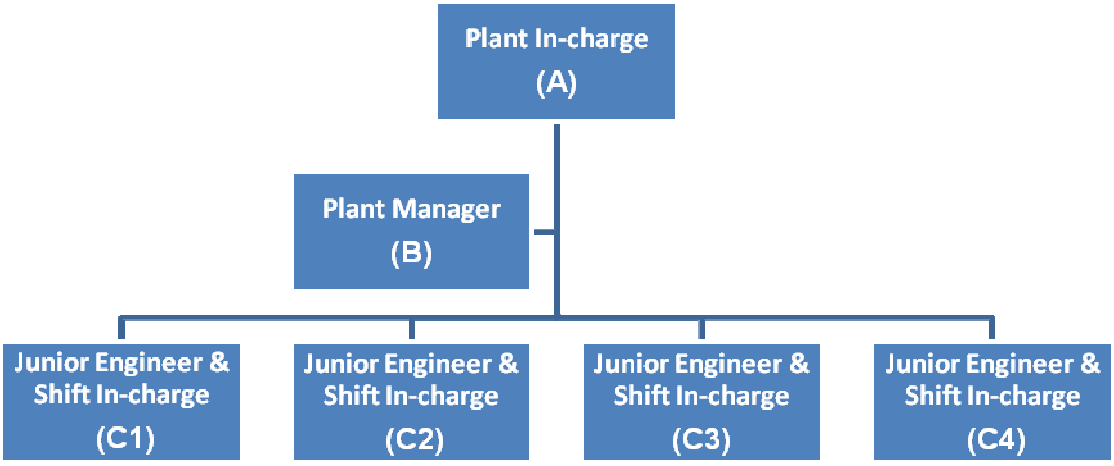
necessary where after billing as well as emission reduction calculation would be as per main meter.

After the replacement of the meters correction would be applied to data recorded by main meter to arrive at correct energy figures for billing as well as emission reduction calculation purposes for period of two months prior to the month in which test check has been done up to time of calibration/replacement of defective meter.

While taking joint meter reading, if effectiveness between data recorded by main check meter if found to be outside the permissible limits, then both the meters would be tested. Pending such calibration of main meter, billing, payment as well as emission reduction calculation would be provisionally based on energy recorded by check meter ad would be subjected to adjustment on testing of check meter. If both main and check meters are found to be beyond the permissible limits of error, the energy recorded by main meter for previous billing month and up to date of removal of such meter in current month shall be corrected by applying appropriate correction factor. If on testing error in main meter is within accuracy limit and check meter is beyond accuracy limit, the main meter reading shall be used for billing as well as emission reduction calculation and check meter would be recalibrated. However, if check meter is found to be within accuracy limit and error in main meter is beyond accuracy limit, then check meter reading would be used for billing as well as emission reduction calculation purposes for previous billing month and till the time main meter is calibrated.

If during joint meter reading both the main and check meters are found to be non-operational, then energy figures for billing as well as emission reduction calculation for previous month would be computed on a mutually agreeable basis between KKKHPL and HPSEB.

KKKHPL shall archive and preserve all the monthly bills raised against net saleable energy for at least two years after end of the crediting period.
The CDM management structure would be as follows -



A = Plant Incharge is the responsible for the overall project activities

B = Plant Manger is responsible for the administration and for the management of the Plant

C1, C2, C3, C4 = Four Junior Engineers have been appointed who would also work as the Shift incharge and also take care of the technical faults occurring in the plant

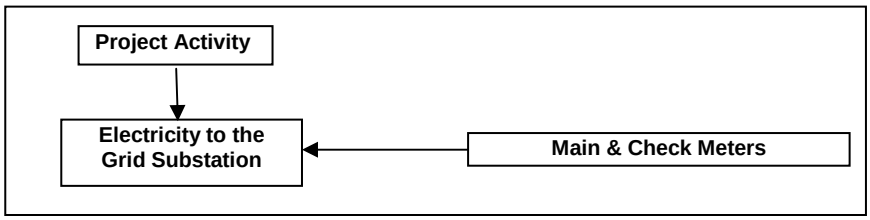
1. The generated electricity from the project is sold to the state electricity utility (HPSEB) for the complete project lifespan, for which the promoter has entered into a long-term power purchase agreement (PPA) with the state power utility. Thus throughout the project cycle (crediting period) and beyond the electricity generated from the project will be monitored by both the project participant and a third party i.e. HPSEB.
2. The generated electricity, before entering into the grid, at the grid interconnection point will be measured by digital, sealed kilowatt hour (kwh) meter on monthly basis and will be documented both on paper as well as in electronic form. The generation records will be signed by the officials of project participant and third party (HPSEB). This generation record will be maintained and would be made available on demand throughout the crediting period of the project.

3. The project participant has appointed a full time project in-charge to manage the overall project activities after commissioning. The project in-charge will be stationed at the project site and will be responsible for monitoring the generation of electricity and maintaining statutory minimum discharge between the diversion weir and tailrace of the stream. To ensure that the micro-ecosystem of the stream is not disturbed due to the candidate CDM project, the discharge in the stream will be measured on fortnightly basis during the lean season of the stream i.e. the months of January, February and March. This data will also be recorded and preserved throughout the crediting period of the project.

4. For duration other than lean season, random measurement of the discharge between diversion weir and tailrace will be carried out.

5. The plant manager would be qualified diploma/degree engineer with 5-7 year experience in power industry. All the shift in-charges would be diploma/degree holders and would undergo related training including data monitoring & report generation etc.

Line diagram showing monitoring points:



SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>

3.0 MW	1.9 MW
05/08/2004	14/07/2007

C.2. Expected operational lifetime of project activity

>>

The expected lifetime of the project is 40 years, which can be extended further for 20 years on the basis of terms and conditions settled at that time.

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>

Renewable crediting period

C.3.2. Start date of crediting period

>>
Starting date of second crediting period: 29/10/2015

C.3.3. Duration of crediting period

>>
7 y-0 m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
Project Impacts

1) **Impacts due to Construction**

Impact on human settlements, flora and fauna

The effects of the projects construction on the human floral and faunal aspects were negligible. There is no displacement of any local inhabitants and very small area of private land is required for project. Therefore, no rehabilitation measures were required.

Air and Water Pollution

The only anticipated air pollution was during the construction phase of the projects due to dust levels in air. Simple procedures like spraying water to keep dust and SPM levels low were followed during construction.

2) **Impact due to project operation**

Land inundation

The project activity is run-of-river project; therefore it doesn't involve any storage reservoir. Thus, the project operation would not lead to any inundation of surrounding area.

The preliminary environmental study has been carried out for the Baragran project findings of the study are described below:

- The proposed Baragran project is the run-of-river scheme and hence doesn't involve any water impoundment and submergence.
- Since the area between diversion weir and powerhouse is sparsely populated, the project shall not cause any displacement of human population.
- Part catchment area upstream of diversion site comprises of protected forests viz. Haripani & Shilagarh none of the project components shall interfere with these forests.
- The project having no submergence and impoundment shall not have any effect on the microclimate of the area because of its small magnitude.
- The construction of the project greatly promotes the socio-economic development of the area. The electricity from the project will be supplied to the HPSEB for distribution to the villages around the project area who hitherto were depending on forest produce for their

energy needs. Also with the availability of cheap & reliable electricity, economic development of the Apple Valley will get a big boost.

- Plantations will be done in the project area for which adequate provision has been made in the cost estimates under head 'M – Plantation'.

D.2. Environmental impact assessment

>>

No adverse environmental impact has been envisaged in the project activity, still all the necessary clearances from the state pollution control board, public works department, department of irrigation and local villages as well the ministry of environment and forests has been obtained.
Since the project capacity is 4.9 MW, therefore according to the Ministry of Environment & Forest, Govt. of India, the project doesn't require EIA study vide Notification No. S.O.60 (E), dated 27/01/1994.

The Ministry of Environment & Forests is the nodal agency in the administrative structure of the Government of India for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. The Ministry is also the Nodal agency in the country for the United Nations Environment Programme (UNEP). One of principal activities undertaken by Ministry of Environment & Forests prevention & control of pollution and protection of environment. The main tools utilized for this include environment impact assessment among all sectors.

The Notification No. S.O.60 (E), dated 27/01/1994 is primary notification regulating the EIA studies and approvals. Various amendments have been carried out in this notification from time to time. Hydel Power is covered under Entry No. 2 of Schedule 1 of the said notification. Point No. 3(b) of the same notification reads as under, "Nothing contained in this Notification shall apply to (b) item falling under entry no.1, 2,3,4,5,7,9,10,13,14,16,17,19,21,25,27 of Schedule-I if the investment is less than Rs.100 crores for new projects and less than Rs. 50 crores for expansion / modernization projects."

The Baragran is micro hydel power project requiring investment of much less than the threshold limit of Rs. 100 Crores. Hence no EIA study was required for the project.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

KKKHPL organised stakeholder consultation meeting with individual village panchayat (elected body of representatives administering the local area) in the area with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. For the consultation with the local stake holder an advertisement was given in the local newspaper 'Divya Himachal' on 28th October 2006. Invitation for stakeholder consultation meetings were sent out requesting the members of village panchayat to participate and communicate any suggestions/objections regarding the project activity in writing. The Stakeholder meeting was held on 5th November 2006 at 12:00 pm, venue was Hilltone Resorts, opposite Spam Resorts, Manali, Himachal Pradesh. On the day of meeting, KKKHPL representatives presented the salient features of the company and the project activity to the participants and requested their suggestions/objections. The opinions expressed by them were recorded and are available on request.

The other stakeholders identified for the project activity are as under:

1. Local Population

2. Himachal Pradesh State Pollution Control Board
3. Himachal Pradesh State Electricity Board
4. Consultants
5. Equipment Suppliers

E.2. Summary of comments received

>>

Stakeholders list includes the government and non-government parties, which are involved in the project activity at various stages. At the appropriate stage of the project development, KKKHPL consulted/would consult stakeholders / relevant bodies to get the comments. The comments received are available on request.
Local population comprises of the local people in and around the project area. The roles of the local people are as a beneficiary of the project. The project activity would provide good direct employment opportunities to the local person, which is encouraging the project.

The project doesn't require displacement of any local population. The distance between the electrical substation for power evacuation and the plant is rather small; hence installation of transmission lines would not create any inconvenience to the local population.
Thus the project will not cause any adverse social impacts on local population. Rather, it will help in improvising their quality of life. KKKHPL has already completed the necessary consultation and documented the approval by local population for this project.

HPSPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. HPSPCB have issued Consent to Establish (CTE) to Baragran HEP project under the provisions of Water (Prevention and Control of Pollution) Act, 1974 / Air (Prevention and Control of Pollution) Act 1981.

As a buyer of power, the HPSEB is a major stakeholder in the project. They hold the key to the commercial success of the project. KKKHPL has already signed Power Purchase Agreement (PPA) with HPSEB.

Project consultants were involved in the project activity to take care of the previous pre contract and post contract issue / activities like preparation of basic and detailed engineering documents, preparation of tender documents, and selection of vendors/suppliers. They would be further involved in supervision of project operation, implementation, successful commissioning and trial run.

In the stakeholder consultation the local people were informed about the Project Activity, its expansion & Clean Development Mechanism. They were also informed about the benefits, which they would have from the project activity. There were some quarries from the local people such as the problem, which they are facing due to the pipeline & about the plantation. The Project Manager satisfied the people by saying that the pipeline would be painted in green or cemented. For the maintenance of the plantation they have appointed a person.

E.3. Consideration of comments received

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In view of various direct and indirect benefits (social, economical, environmental), no concerns were raised during the consultation with stakeholders, hence it is not required to take due account of the comments.

The stakeholder consultation meet was held on 5th November 2006, 12:00 pm at Hilltone Resorts, opposite Spam Resorts, Manali, Himachal Pradesh. The invitation for the Stakeholder Consultation was advertised on 28th October 2006 in local newspaper ‘Divya Himachal’ in the local language,

requesting the members of village panchayat to participate and communicate any suggestions/objections regarding the project activity in writing.

The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, power purchase agreement, local stakeholder's comments etc., were considered in the preparation of CDM project design document.

SECTION F. Approval and authorization

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The letter of approval from the host country for the project activity has already available at UNFCCC website.

Appendix 1. Contact information of project participants

Organization name	KKK Hydro Power Limited
Country	India
Address	I-41, DLF Industrial Area, Phase-I, Faridabad, Haryana 121 003
Telephone	91 0129-2257552-53, 4113168
Fax	91 0129-2270212
E-mail	kkkhpl@kkkhydropower.com
Website	-
Contact person	Mr. Pawan Kumar Kohli

Organization name	Bunge Emissions Fund Limited
Country	Switzerland
Address	13, Route de Florissant- PO Box 518
Telephone	-
Fax	-
E-mail	-
Website	-
Contact person	Ms. Tanya Weekes

Appendix 2. Affirmation regarding public funding

No public funding is available for this project activity from annex 1 countries.

Appendix 3. Applicability of methodologies and standardized baselines

As described under Section B.2 of the PDD.

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

As described under Section B.6.3 of the PDD.

Appendix 5. Further background information on monitoring plan

As described under Section B.7.2 of the PDD.

Appendix 6. Summary report of comments received from local stakeholders

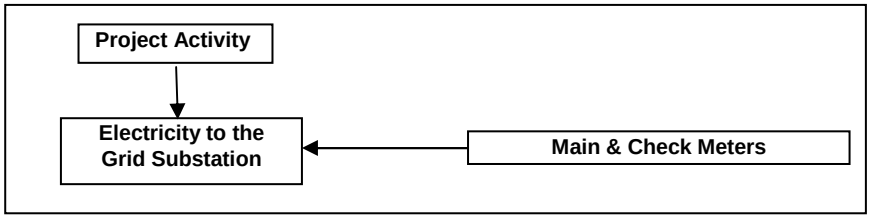
As described under Section E.2 and E.3 of the PDD.

Appendix 7. Summary of post-registration changes

- During registration, calibration frequency has been considered once in six month.

  In line with para 18.1.b of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf) says:
  All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the billing center via communication network, the communication system and terminal equipment shall be tested and rectified. The meters may be tested using NABL accredited mobile laboratory or at any accredited laboratory and recalibrated if required at manufacturer's works.
  In line with above guideline for meter calibration by Central Electricity Board, Govt. of India, the calibration frequency corrected as once in five year. These meters also tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters.

- During renewal crediting period, PDD had been developed in line with prevailing Project design document form i.e. version 06. Further, version of Project design document form has been revised now. In line with guideline for Project design document form and paragraph 259 of Project Standard Version 01.0, line diagram of monitoring system showing all relevant monitoring points has now been incorporated in section B.7.1 of PDD. The schematic representation of metering arrangement is demonstrated below:



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Document information

Version	*Date*	*Description*
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15

Version	*Date*	*Description*
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document