CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>>
2 x 5MW Baner Khad & Iku Khad Hydro Electric Projects, in Himachal Pradesh, India

A.2. Description of the small-scale project activity:

>>
The project activity comprises installation and operation of two 5 MW hydroelectric plants in Himachal Pradesh state, India. The proposed plants utilise hydro potential available in Baner Khad & Iku Khad, tributaries of the River Beas in Himachal Pradesh for electricity generation for a grid system managed by the Himachal Pradesh State Electricity Board (HPSEB), a state owned power utility. The anticipated annual electricity generation for the grid system is around 49.67 GWh. By virtue of its cleaner energy source the project activity is expected to reduce greenhouse gas emissions to an extent of 417,160 tCO_2e over the period of 10 years. Apart from reduction of greenhouse gas emissions, the project activity contributes to the sustainable development as described below and meets the sustainable development criteria as set by the National CDM Authority (Designated National Authority) of India.

a) The project activity causes mobilisation of huge financial resources to an underprivileged area where there is no sufficient infrastructure and amenities. Total investment in the proposed projects is around Rs.556 millions. This is a very significant in an area where high development needs exist. The project activity contributes to the development of infrastructure in the area, so that the project benefits the local people.

b) The proposed projects employ around 500 persons during construction stage and around 70 persons during operation of plants. This is an additional employment generated by the projects, which would not have occurred in the absence of the project activity. Opportunities will be extended to the local people.

c) The project activity creates ambience for additional development activities in the region, thus the project activity alleviates the poverty level in the area. The project activity contributes to the gender equality by providing equal opportunities for both genders.

d) The project activity provides additional electricity generation capacity from renewable energy sources contributing to achieving the target of 10,000 MW by the year 2012.

e) The project activity demonstrates harnessing hydro potential in difficult terrains and in small streams in the Himalayan region. The project activity also demonstrates the opportunities available for cleaner energy technologies such as CDM. Many more projects may come up in future as a result of the project activity.

f) The project activity contributes to reducing energy deficit in the region. This project activity will help the poor and vulnerable sections of the society who are often hit by inadequate power supply, load shedding and poor power quality to receive more reliable supply of power.

A.3. Project participants:

>>

Name of the party involved ((Host) indicates a host party)	Private and/or public entity (ies) project participants	Whether party involved wishes to be considered as project participant
India (Host)	**Private Entity:** Vamshi Hydropower Energies Private Limited	No.

A.4. Technical description of the small-scale project activity:

>>

The proposed CDM project activity is a bundle of two identical run-of-river hydroelectric plants namely Baner-III and Iku-II, each having a capacity of 5 MW. Both hydroelectric plants are proposed by a single project participant. Each hydroelectric plant involves construction of a raised drop type trench weir across the stream, intake chamber, desilting chamber, water conductor system in the form of D–shaped tunnel, forebay, penstocks, power station and tailrace canal. Power will be generated at a lower voltage of 6.6 kV, which will be stepped up to higher voltage level at 33 kV within the project boundary to facilitate export of power to the grid system of Himachal Pradesh State Electricity Board. The project activity generates around 49.67 GWh for the grid system.

Brief technical parameters of both the plants under the CDM project activity are furnished below:

Parameter	Baner - III	Iku - II
Hydrology		
Catchment area at diversion site	13.59 sq. km	19.29 sq. km
Design Discharge	2.70 cumecs	1.69 cumecs
Gross head	239.80 m	370.20 m
Net rated head	219.80 m	351.00 m
Plant Equipment		
Type of hydro turbine	Horizontal axis, Pelton Wheel	Horizontal axis, Pelton Wheel
Type of generator	Synchronous	Synchronous
No. of generating units	2	2
Capacity of each generating units	2.5 MW	2.5 MW
Generation voltage	3.3. KV	3.3 KV
Grid interfacing voltage	33 KV	33 KV
Frequency	50 Hz	50 Hz
Energy		
Gross energy generation	26.94 GWh	27.06 GWh
Annual export to the grid	24.78 GWh	24.89 GWh

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>>India

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

>>Himachal Pradesh

A.4.1.3. City/Town/Community etc:

>>

Baner-III

District : Kangra
Tahsil : Palampur
Village : Jia

Iku-II

District : Kangra
Tahsil : Dharmasala
Village : Saleg

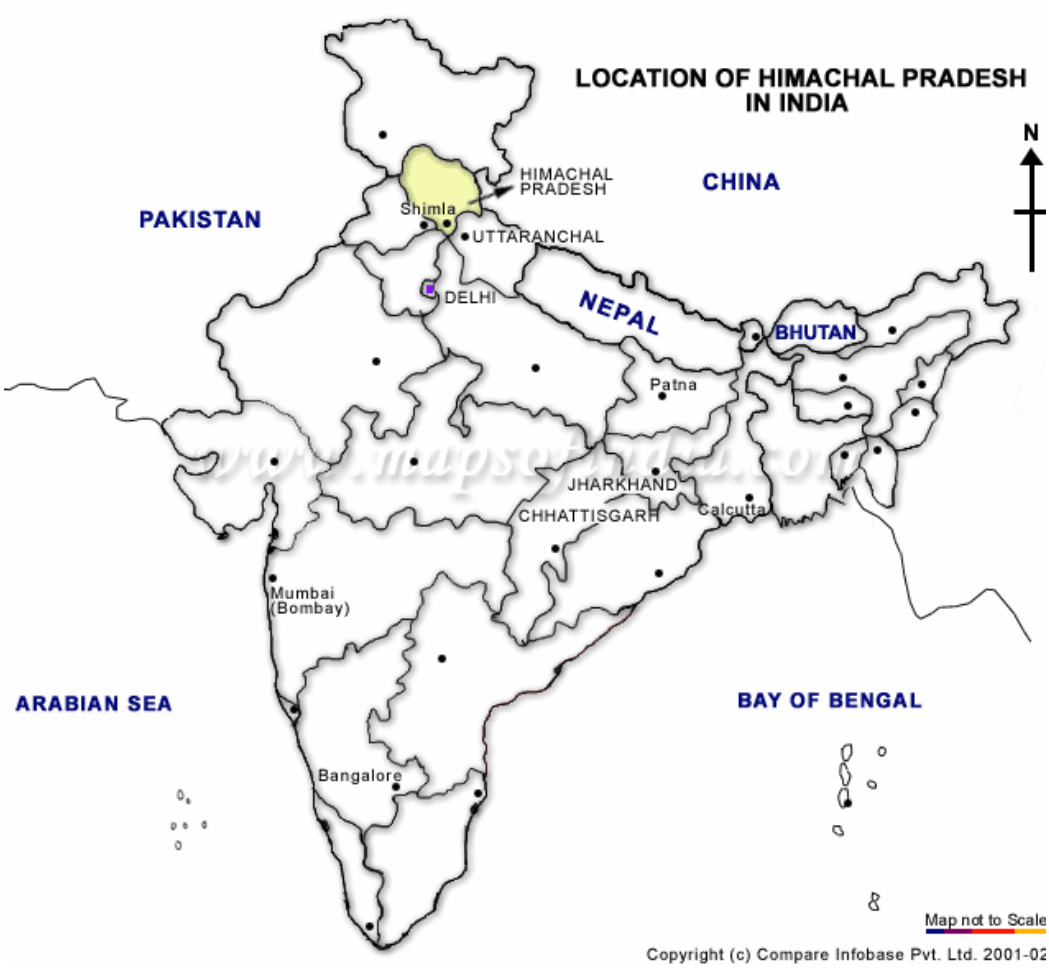
A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity (ies):

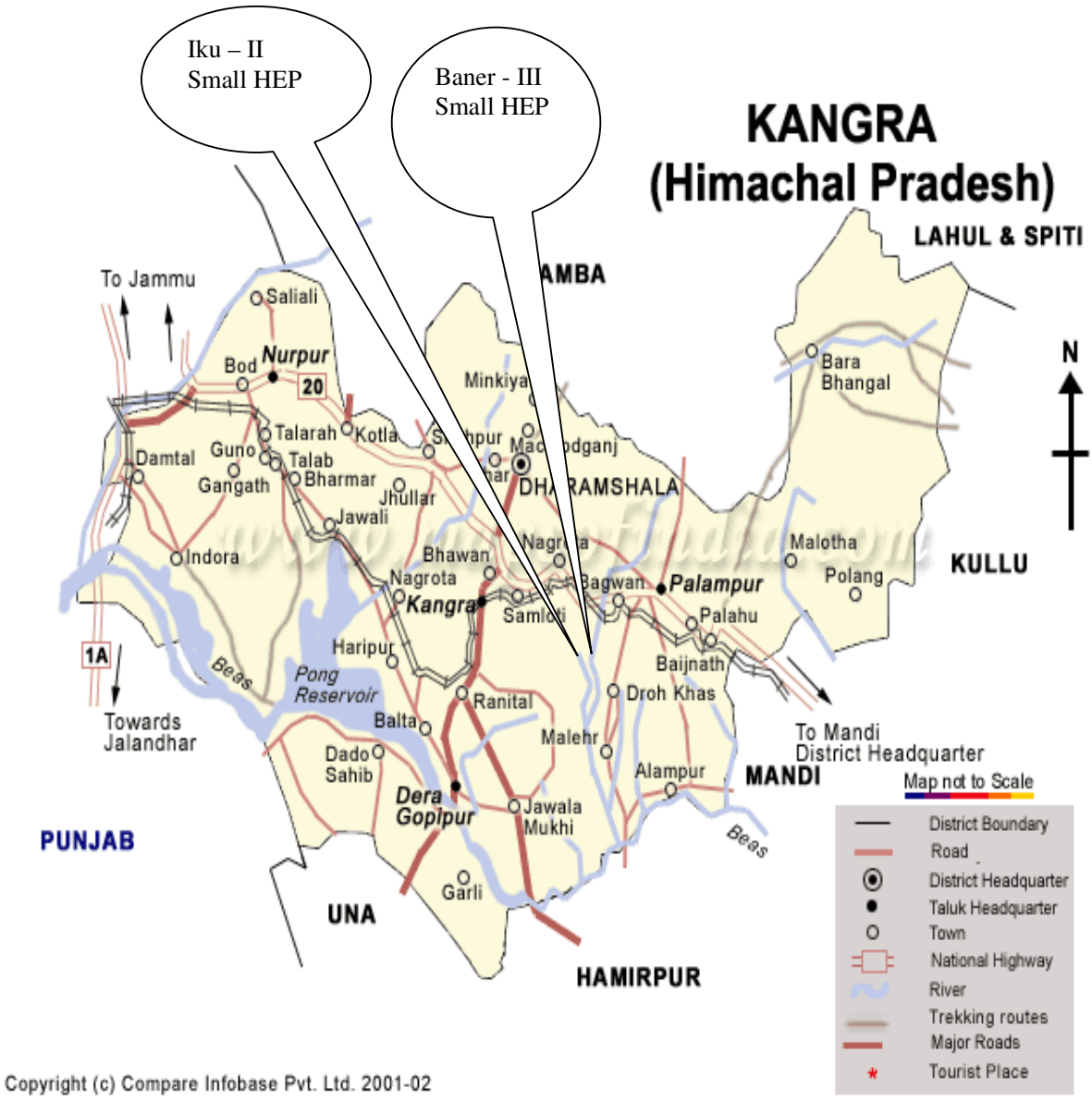
>>

Baner-III plant is located on upstream of existing Baner HEP of HPSEB on Baner Khad, a tributary of Beas River. The project is located near village Jia, Palampur Tahsil, Kangra District of Himachal Pradesh. The Project site is at 25 km distance from Kangra and 241 km from Shimla, the state capital, by road. A motorable road exists from Jia. The Geographical location of the project site is between longitude 76^{o}-20' E and 76^{o} - 25' E and latitude 32^{o}- 30' N & 32^{o}- 35' N.

The Iku - II plant is located - across Iku Khad, a tributary of Baner Khad. The plant site is located at a distance of 5 km from village Saleg in Kangra district of Himachal Pradesh. The project site is at a distance of 17 km from Kangra, 123 km from Pathankot and 241 km from Shimla. The Geographical location of project is between longitude 76^{0} - 24' – 45'' E & 76^{0} - 25'-36'' E and latitude 32^{0}-11'-45'' N & 32^{0}-12'-48'' N.

The location maps of project sites are furnished below.


LOCATION OF HIMACHAL PRADESH IN INDIA
N
HIMACHAL PRADESH
CHINA
PAKISTAN
Shimla
UTTARANCHAL
DELHI
NEPAL
BHUTAN
Patna
JHARKHAND
CHHATTISGARH
Calcutta
Mumbai (Bombay)
ARABIAN SEA
BAY OF BENGAL
Bangalore
Map not to Scale
Copyright (c) Compare Infobase Pvt. Ltd. 2001-02



A.4.2. Type and category(ies) and technology of the small-scale project activity:

>>

According to the Appendix B to the simplified modalities and procedures for small-scale CDM project activities, the proposed project activity falls under the following type and category.

Project type : Type I - Renewable Energy Projects
Category : I.D - Renewable Electricity Generation for a grid.

Since capacity of the proposed project activity is 10 MW, which is well below the qualifying capacity of 15 MW, the project activity can be identified as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures can be applied.

The technology or power generation process using hydro resources is converting the potential energy available in the water flow into mechanical energy using hydro turbines and then to electrical energy using alternators. The generated power will be transformed to match the nearest grid sub-station for proper interconnection and smooth evacuation of power.

No technology transfer is involved in the project activity.

The water and power studies carried out for this project demonstrated that the project activity will remain under the limits of SSC through out the crediting period. To determine the capacity of the power plant two important inputs are required namely the head available and discharge of water in the stream. The hydrology studies carried out for the streams have revealed that the capacity of power generation cannot exceed 10 MW. Further, the power generation capacity of the project activity is limited by the installed capacity of the generators installed in the plants. Hence, the project participants affirm that the capacity of the project would remain as 10MW and would be within the limits of small scale through out the crediting period.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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The proposed project activity generates electricity using hydro potential and exports the generated power to the regional grid system. Hence, the generation by the proposed project activity is non-GHG source and therefore the proportion of fossil fuel based generation in the grid will be reduced by the project activity leading to lesser carbon intensity in the grid.

Emissions reductions due to the project activity mainly depend on the energy fed to the grid system and the emission factor of the connected grid system.

The proposed project activity displaces northern regional grid electricity, which is fed by both fossil and non-fossil fuel based generation sources. As per the latest records of power generation, the share of thermal power coming from coal, lignite and gas are around 74%. The connected grid system i.e northern regional grid is dominated by fossil based power generation, which is evident from the share of fossil fuel based power accounting to 74% of the total grid electricity. Further, the significant energy shortage exists to an extent of around 11.51% in the northern region such that huge financial resources need to be mobilised. Due to the prevailing resource potential, the reliance will be only on the coal based power plants. This is evident from the fact that large capacity additions are not possible through hydro, nuclear,

wind, biomass and natural gas. Because of this increasing dependence on coal based power projects, the carbon intensity of the connected grid electricity system increases in the near future.

On the other hand, the renewable energy sector in India is advancing at a very slow pace, even though the Govt. of India encourages development of renewable energy projects in India. In the year 2000, Govt. of India has set a target of 10000 MW additions by 2012 from renewable energy sources. Under the present market conditions and unfavourable market environment in the power sector, achieving this target is highly unlikely.

In view of the above discussion as demonstrated in section B.3, it can be concluded that the project activity would not have occurred without the CDM and that the project activity generates emission reductions in addition to that of the baseline.

The project activity is expected to generate around 49.67 GWh per year for the grid system and depending on the grid electricity emission factor, the anticipated emission reductions would be around 417,160 during 10 years of crediting period.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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The chosen crediting period is 10 years, which starts from the year 2008. Yearly estimate of emission reductions during the crediting period is provided below.

Year	Period	Annual estimation of emission reductions (tonnes of CO_2 eq.)
1	2008	41,716
2	2009	41,716
3	2010	41,716
4	2011	41,716
5	2012	41,716
6	2013	41,716
7	2014	41,716
8	2015	41,716
9	2016	41,716
10	2017	41,716
Total emission reductions (tonnes of CO_2 eq.)		417,160
Total number of crediting years		10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 eq.)		41,716

A.4.4. Public funding of the small-scale project activity:

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No public funding from Annex I Party is involved in this project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

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The project participants hereby confirm that the proposed project activity is not a debundled component of another larger project activity.

The project participants further confirm that they have not registered any small scale CDM activity or applied to register another small scale CDM project activity within the same project boundary, in the same project category and technology/measure.

SECTION B. Application of a baseline methodology:

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

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Project Title: Type 1 – Renewable Energy Project
Reference: I. D. Renewable Electricity Generation for a Grid

B.2 Project category applicable to the small-scale project activity:

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The project category is renewable energy generation for a grid system which is fed by both fossil fuels fired generating plants and non-fossil fuel based generation plants. Hence the applicable baseline as per clause 29 of Appendix B, indicative simplified baseline and monitoring methodologies is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2/kWh$) calculated in a transparent and conservative manner.

Under clause 29 of Appendix B, two methods of calculating the emission co-efficient are given. Under clause 29(a) emission coefficient is calculated as the average of the approximate operating margin and build margin. Under the second method i.e. 29(b), the emission factor is the weighted average emissions of the current generating mix. Grid system and the baseline methodology for the proposed activity are described below.

Grid System

The project participants considered the regional grid as the appropriate electricity system for the project activity, which is the Northern Regional Grid, which has no significant transmission constraints for power transmissions from one state to other.

Emission Co-efficient

Out of the two methodologies specified in the indicative simplified baseline and monitoring methodologies, the second method viz. 29(b), the weighted average emissions (in kg CO_2eq / kWh), is chosen for the proposed project activity due to the following reasons.

The grid system chosen for the proposed activity is presently under deficit situation. As per NREB Annual Report 2005-06, the grid system is facing 11.51% energy shortage and about 12.68% peak deficit. Further, as per the 16th Electric Power Survey by Central Electricity Authority, the growth in the energy requirement is around 6.9% till 2017. Present planned capacity additions will not be sufficient to meet the

energy demand and it is most likely that all power generating plants will be in operation during the crediting period.

Non-fossil fuel energy sources such as hydro, biomass, wind and nuclear are very limited such that the energy development compared to the demand is very low. Ministry of Non-conventional Energy Sources has targeted an addition of 10% of the total installed capacity of the year 2001 i.e. 10,000 MW through renewable energy sources by the year 2012. Northern Region is expected to add about 2784[1] MW approximately. But, it is unlikely to achieve this target due to limited renewable energy sources. Substantial nuclear capacity addition is not possible during the crediting period. Only two nuclear projects are under construction in the northern region with a total capacity of 440 MW[2], which are expected to commission during 2007. Hence carbon intensity of the grid cannot be reduced from the non-fossil fuel based power generation.

Although the fossil fuel based generation mix in the grid system increases during the crediting period, choice of weighted average emissions of the current generation mix (Option 29.b of simplified baseline methodologies) as the baseline for the proposed project activity makes the estimation of emission reductions conservative over the choice of average of operating and combined margin (Option 29.a of simplified baseline methodologies). 88

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

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Justification of application of simplified methodologies to the project activity

The capacity of the project is only 10 MW, which is less than the qualifying capacity of 15 MW to use simplified methodologies. Hence, the project satisfies the decision 17/CP.7, paragraph 6 (c) of the simplified modalities and procedures of SSC project activity.

Further, the project activity is generation of electricity for a grid system using hydro potential. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

Justification of additionality of the project

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way. Project participants identified the following barriers for the proposed project activity.

[1] Total installed capacity in India in the year 2001 is about 100,000 MW. 10% of it is targeted for addition by the year 2012 through renewable energy sources. As per the Annual Report of 2001-02 of Ministry of Power, the installed capacity of Northern Region is 27,843 MW in the year 2001 and 10% of the installed capacity amounts to 2,784 MW which is expected to be added through renewable energy sources.

[2] Nuclear Power Corporation of India Ltd., Rajasthan Atomic Power Station in Rajasthan. Units 5 & 6 of capacity 2 x 220 MW are expected to be commissioned during 2007.

Investment Barriers:

The project proponent required investing around Rs.556 millions for the two small hydro projects, which translates into Rs.55.6 millions per MW, which is high compared to the investment required for establishing conventional power projects. Even though the operating cost is low for hydropower projects, securing finances for the project to the extent required is difficult due to the risks associated with hydropower projects such as low plant load factor, uncertainty with regard to the availability of water in streams, etc.

Construction of the two hydroelectric plants involves number of barriers, as explained below:

***BANER-III SHP*:**

- Construction of Powerhouse is proposed at an elevation of 1745 meters. The existing infrastructure will not be sufficient for mobilizing construction material to the construction location and hence, project participants had to consider widening and strengthening of the present un-motorable road of 11 km, strengthening of bunds at some places to prevent land slides and construction of an additional causeway and an approach road near the power house.

- The forebay needs to be constructed at an elevation of 2060 meters. No access is available to the construction point and therefore a rope way is planned for movement of construction material for a length of around 600 m.

- The movement of material from the forebay to the other component of the project is through mules and the distance from the forebay to the intake structure is 4 km.

- The project further requires construction of a tunnel of 1.5 km length for the water conductor system. The tunnel is of D-shaped which has to be manually constructed due to its size. Mechanized construction of tunnel is not possible.

- The terrain is of loosely held rocks and digging down for installation of hydro-turbines and generators is a difficult task.

- Construction materials like steel, cement, sand and aggregates have to be transported from long distances to the project site which resulted in additional expense towards transportation, almost double to that of the cost of material itself.

- Another barrier the project construction activities face is the lack of electricity, communication facilities, and proper civic amenities etc. in the area. The project promoters had to develop these facilities before the actual implementation of the project.

IKU-II SHP

- Similar to the Baner-III project, the Iku-II project location is also at a higher elevation. Sufficient infrastructure is not available in the area. Hence, the project proponents had to mobilize additional investments towards creation of sufficient infrastructure before the start of actual project implementation. An approach road needs to be constructed for about 4km length to get access to the project construction site.

- The proposed location of Powerhouse is at an elevation of 1648 m and forebay is at an elevation of 2043 m. There is no means of transportation of construction material to the construction place and therefore construction of a rope way is considered. From forebay, the movement of material is again by mules and a mule track of 4 km length has been considered for development.

- The project required construction of a D-shaped tunnel for a length of 2 km and the tunnel has to be manually constructed as the mechanized construction is not possible.

- Construction materials like steel, cement, sand and aggregates have to be transported from long distances to the project site which resulted in additional expense towards transportation, almost double to that of the cost material itself.

- Another barrier the project construction activities face is the lack of electricity, communication facilities, and proper civic amenities etc. in the area. The project promoters had to develop these facilities before the actual implementation of the project.

All the above barriers with regard to the construction of hydroelectric plants in hilly terrain prevent any new investments in the region.

Hence, the project activity involved investment barriers.

Prevailing practice:

In the Indian power sector, the common practice is investing in only medium or large scale fossil fuel fired power projects, which is evident from a host of planned projects that comprises mostly large-scale fossil fuel based power generation projects. This is mainly due to the assured return on investment, economies of scale and easy availability of finances. This is also true in the Northern Region.

The share of electricity from small hydroelectric projects in India's total installed capacity is very small. According to the latest statistics published by the Ministry of Non-conventional Energy Sources (MNES) the total installed capacity of small hydroelectric projects is only at 2333 MW[3] including projects under construction where as the India's total installed capacity is around 124287 MW [4]as on 3rd April, 2006

In view of the above, the proposed project activity is additional and not the same as the baseline scenario.

Other Barriers

Geological risks:
The project sites are located close to the epicenter of Kangra earthquake occurred in the year 1905 and it falls under seismically active zone. The possibility of geology changing frequently cannot be ruled out in this area, which may impose severe obstructions in the functioning of tunnel and powerhouse.

Hydrological risks:
Project activity is proposed on two small streams which are tributaries with a limited water flow, often snow fed and the power generation is possible whenever there is water flowing in the stream. There is a high uncertainty with regard to the availability of water resources in the streams. This will result in an

[3] Ministry of Non-conventional Energy Sources www.mnes.nic.in/annualreport/2005_2006_English/CH9/2.html
[4] Ministry of Power, Government of India www.powermin.nic.in/generation/generation_state_wise.htm

uncertainty with respect to the return on investment. The actual gauged data is available only for a short period and cannot be relied for construction of hydroelectric projects. The project participants have to consider only the simulated data and arrived the dependability based on the data available for nearby catchments. This is a risk as the nearby catchments characteristics such as run-off; absorption, ice, etc. cannot be exactly studied at the feasibility stage. Hence, a possibility of error in the calculation of discharges cannot be ignored for energy calculations and lack of exact data on flows is a barrier for investments in hydroelectric sector. Further, the weir has been designed for a flood discharge calculated by conventional methods. In the absence of any upstream project, the possibility of flash floods occurring cannot be ruled out. This is a potential risk for the project activity.

Hence, the proposed project is additional and not the same as the baseline scenario and would not have occurred without the CDM. CDM revenues are expected to leverage the project economics and have an influence on the decision to implement the project activities.

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

>>

The project boundary specified in the Appendix B of simplified modalities and procedures is that encompasses the physical, geographical site of the renewable generation sources.

For the proposed project activity the project boundary is that encompasses diversion structure, water conductor system, penstock, powerhouse, power evacuation system and tail race.

Two hydroelectric plants have their individual project boundaries. The spatial extent of the project activity covers all plants connected to the Northern region grid system.

B.5. Details of the baseline and its development:

>>

The baseline for the project activity is constructed according to 29.b. i.e. weighted average emissions of the current generation mix (in $kgCO_2e/kWh$), applicable for Type I.D CDM project activities, as contained in Appendix B of simplified modalities and procedures for small scale CDM project activities.

Date of completion of baseline: 24/05/2006

Name of the person / entity determining the baseline:
Zenith Corporate Services (P) Ltd.

Contact information of the above entity furnished below:

Organization:	ZENITH CORPORATE SERVICES (P) LTD.
Street/P.O. Box, Building:	10-5-6/B, MYHOME PLAZA, MASABTANK,
City:	HYDERABAD
State/Region:	ANDHRA PRADESH
Postfix/ZIP:	500028
Country:	INDIA
Telephone:	+91 40 2337 6630, 2337 6631
FAX:	+91 40 2332 2517
E-Mail:	zenithenergy@sancharnet.in

URL:	www.zenithenergy.com
Represented by:	
Title:	DIRECTOR
Salutation:	MR.
Last Name:	REDDY
Middle Name:	MOHAN
First Name:	ATTIPALLI

The above entity is not a project participant.

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>>

01/04/2006

C.1.2. Expected operational lifetime of the small-scale project activity:

>>

30 years.

C.2. Choice of crediting period and related information:

>>

C.2.1. Renewable crediting period:

>>

Not chosen

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>

01/01/2008

C.2.2.2. Length:

>>

10y– 0m

SECTION D. Application of a monitoring methodology and plan:

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>>

The name of the methodology applied for the project activity is ***"Metering the Electricity Generated".***

This is in accordance with Appendix B of simplified modalities and procedures for small-scale CDM project activities. The reference to the proposed monitoring methodology is Clause 31 of Appendix B of simplified modalities and procedures for small-scale CDM project activities.

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

>>

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. As the power plant is of 10 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

D.3 Data to be monitored:

>>

This monitoring plan requires monitoring of the power exported to the Himachal Pradesh State Electricity Board grid system and the emission factor of the northern region grid system. Necessary documents required for verification of the data will be maintained for later archiving. Using the power exported to the grid, emission reductions will be estimated as illustrated in Section E. Emission reductions generated by the project will be monitored at regular intervals. All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity whichever occurs later.

The monitored data will be presented to an independent verification agency or DOE to whom verification of emission reductions is assigned.

The following data is to be monitored to ascertain project emissions and emissions reductions

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	For how long is archived data to be kept	Comment
D.3.1	Power exported by each plant in the bundle	MWh	m	Monthly	Full (100% during the month)	Paper (Only sales records can be verified)	2 years after crediting period	The data will be recorded at the grid substation, which is under the control of HPSEB. The energy measured using calibrated meters and recorded at HPSEB substation will be monitored. Records of measurement will be used for verification of emission reductions. Sales bills / receipts may be compared as an alternative proof of the power exported to the grid.
D.3.2.	Emission Factor	tCO_2/MWh	c	Yearly	100%	Paper	Minimum of two years after last issuance of CERs	Emission factor will be calculated for the Northern region grid using the data published by the Central Electricity Authority.

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary
D.3.1	Low	The data will be recorded at the grid substation, which is under the control of HPSEB. The energy measured using calibrated meters and recorded at HPSEB substation will be monitored. Records of measurement will be used for verification of emission reductions. Sales bills / receipts may be compared as an alternative proof of the power exported to the grid.
D.3.2.	Low	This data item is a calculated value based on Central Electricity Authority database and the quality control is not in the control of project participants. Hence, no quality control procedures are envisaged for this data item.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

The management structure proposed for monitoring of emissions and reductions due to the project activity comprises a GHG audit team / committee with two or three of the plant operating personnel. The committee will be appointed as soon as the project implementation is nearing completion and will be authorized to perform various functions such as measuring, recording, storage of measured data and reporting to the project participants. The outcome of the committee, in the form of GHG audit reports, will be monitored monthly and annually. The committee comprises representatives of project participants and other experts as decided from time to time. It was proposed that whenever required external independent GHG auditors would be deputed for the monitoring activities.

The power purchase agreements to be signed by the project participants with HPSEB has clauses on quality assurance and quality control measures to be employed by the project participants and include installation of main meters supported by check meters, calibration requirements for energy meters, procedures for recording the energy values, emergency preparedness etc.

D.6. Name of person/entity determining the monitoring methodology:

>>

The contact information of the entity, which has determined the monitoring methodology, is given below.

Organization:	ZENITH CORPORATE SERVICES (P) LTD.
Street/P.O. Box, Building:	10-5-6/B, MYHOME PLAZA, MASABTANK,
City:	HYDERABAD
State/Region:	ANDHRA PRADESH
Postfix/ZIP:	500028
Country:	INDIA
Telephone:	+91 40 2337 6630, 2337 6631
FAX:	+91 40 2332 2517
E-Mail:	zenithenergy@sancharnet.in
URL:	www.zenithenergy.com

Represented by:	
Title:	DIRECTOR
Salutation:	MR.
Last Name:	REDDY
Middle Name:	MOHAN
First Name:	ATTIPALLI

The above entity is not a project participant for the project activity.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

Appendix B of the simplified modalities and procedures for small-scale CDM project activities does not provide specific formulae for the baseline for project Category I.D.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

The proposed project activity is a bundle of run-of-the river hydroelectric plants. No anthropogenic emissions by sources of greenhouse gases within the project boundary are identified. Hence, no formulae are applicable.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

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No leakage is applicable for the project activity, hence no formulae are applicable.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

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The sum of E.1.2.1 and E.1.2.2 is Zero.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

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As explained in Section B.2, the baseline for the project activity is kWh produced by the hydroelectric project multiplied by an emission co-efficient calculated in a transparent and conservative manner as the weighted average emissions (in $kgCO_2/kWh$) of the current generation mix.

For the proposed project activity the current generation mix is taken for the Northern Region grid system. Central Electricity Authority publishes the annual energy generation from all power generating stations in the grid system.

Formula used for calculation of the baseline is given below.

Step 1: Estimation of emissions from each fuel source

Emissions from each fossil fuel source are estimated using the following formula.

Emissions (tCO_2)	=	**Actual Generation (GWh)**	X	**CEF for fuel (tC/TJ)**	X	**Net Heat Rate (TJ/ GWh)**	X	**Conversion factor (44/12)**

In the above calculation, actual generation is obtained from CEA publications. Carbon Emission Factors (CEF) for fuels is taken from IPCC default values. Since collecting heat rates for all plants connected to the grid system is difficult, only heat rates as specified by the Central Electricity Authority are considered for calculation of baseline emissions. This is reasonable for a small-scale project activity whose generation is negligibly small compared to the total grid generation.

Using the above formula, emissions from each type of fossil fuel source are estimated. For non-fossil fuel sources such as hydro and nuclear, GHG emissions are not applicable.

Step 2: Total Baseline emissions

Total baseline emissions are calculated by summation of emissions from all fossil fuel sources.

Step 3: Estimation of baseline or Emission Coefficient

Baseline emission factor is estimated as the weighted average of all existing generation sources using the following formula.

Baseline emission Factor (tCO_2/GWh)	=	**Baseline emissions (tCO_2)**	/	**Total net energy in the system (GWh)**

Using the above formula baseline / emission coefficient is estimated as 839.88 tCO_2/GWh.

Step 4: Estimation of baseline emissions

Baseline emissions or emissions avoided by the project activity are estimated using the following formula.

Baseline Emissions or avoided emissions (tCO_2)	=	**Emission co-efficient (From Step 3) (tCO_2 /GWh)**	X	**Actual generation project activity (GWh)**

The resulting baseline emissions during the crediting period are tabulated below.

Table E.1. Baseline emissions during the entire crediting period.

Year	Emission Co-efficient (tCO_2/GWh)	Power Exported, (GWh)	Baseline emissions, (tCO_2)
2008	839.88	49.67	41,716
2009	839.88	49.67	41,716
2010	839.88	49.67	41,716
2011	839.88	49.67	41,716
2012	839.88	49.67	41,716
2013	839.88	49.67	41,716
2014	839.88	49.67	41,716
2015	839.88	49.67	41,716
2016	839.88	49.67	41,716
2017	839.88	49.67	41,716
Total Emission Reductions			417,160

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

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Difference between E.1.2.4 and E.1.2.3, which represent emission reductions of the project activity are given in the table given below.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Baseline emissions, **E.1.2.4**, tCO_2	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716
Project emissions, **E.1.2.3**, tCO_2	0	0	0	0	0	0	0	0	0	0
Difference between **E.1.2.4 and E.1.2.3,** tCO_2	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716	41,716

E.2 Table providing values obtained when applying formulae above:

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S. No	Year	Annual estimation of emission reductions in tonnes of CO_2 eq.
1	2008	41,716
2	2009	41,716
3	2010	41,716
4	2011	41,716
5	2012	41,716
6	2013	41,716
7	2014	41,716
8	2015	41,716
9	2016	41,716
10	2017	41,716

Total estimated reductions (tonnes of CO_2 eq.)	417,160
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 eq.)	41,716

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

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As per the Ministry of Environment & Forest (MoEF), Government of India, Environmental Impact Assessment (EIA) is not required for the projects with an investment of less than US $ 21.74 millions. Since the total cost of the proposed projects is only US $ 12.086 millions and also comes under the small-scale category of CDM projects as per UNFCCC guidelines, doesn't call for EIA study. However prior to the project's implementation, the project shall be notified to the Himachal Pradesh State Pollution Control Board (HPPCB) for necessary evaluation and approval.

Project participants conducted environmental studies and found that the proposed project is not likely to have any significant negative socio-economic and environmental effects on local populace during execution or during the entire operational lifetime. Highlights of studies are furnished below.

- The project is run of the river scheme, which does not involve any impounding of water, and there is no habitation on the banks, hence neither submergence will occur nor rehabilitation activity is needed.
- Since the project utilizes only hydro potential available in the river for power generation and not any other fossil fuels, the project does not lead to any GHG emissions. So, the project doesn't have its influence on the microclimate of the region and reduce global warming impacts.
- The danger of erosion and disturbance to hill slopes is minimized as the land required for the proposed project is barren which does not involve felling up of any trees.
- The catchment areas upto the weir sites is only around 23 square kilometres and comprises mainly of gneisses, which are by and large quite compact and do not pose problem of possible potential slides in general. The catchments in the higher reaches of khad and nalla are not approachable. It is proposed to provide engineering measures such as contour drainage, easing of critical slopes etc. wherever required around the project area. Afforestation is proposed in the catchment and provision of funds has been kept for this purpose.
- The constructions of this project neither alters nor contributes to raising of water level in the stream thereby, does not support any aquatic life. Hence the scheme shall not endanger the species of local flora and fauna, if any.
- The construction of roads and project components will not involve felling of neither any tree nor lead to deposition of excavated material in the khad to affect environment adversely.
- Since the local labour will be deployed, only skilled and specialists would be brought from outside and thus a small colony shall only be needed.

- The construction labour and project staff will be educated in terms of environmental concerns and relevant antipoaching laws in consultation with Forest Department. Apart from this, Notice Boards shall be placed at appropriate places warning people against poaching in the area.

With all the above it is clear that the project conserves local resources, reduce pressure on the local environment to a great extent, provide improved health and other environmental benefits and also meet local renewable energy portfolio standards and environmental policies.

SECTION G. Stakeholders' comments:

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

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A project proponent who desires to set up hydro project in Himachal Pradesh is required to take the following steps for obtaining public comments before starting of the project work.

Government of Himachal Pradesh had made it mandatory for all projects to go for public consultation before implementation. It should be publicized in national and vernacular dailies and invites objections/ comments from the public during a period of 90 days before issuing license. Based on the feedback, the Government of Himachal Pradesh will decide whether the project to be sanctioned or withheld.

Similarly, Electricity Regulatory Commission of Himachal Pradesh (ERCHP) also makes a public announcement in local dailies for public comments on the project before according clearance for the tariff and export of power into HPSEB grid. Announcement will kept open for 60 days. It considers public comments in its approval process before giving approval.

The project also requires No Objection Certificate (NOC) from the local village panchayat, which is the elected statutory body of the local populace. NOC will be given after getting comments from the local public.

The main stakeholders for the project are the local people residing around the project area and the Government of Himachal Pradesh. Apart from them the various stakeholders involved in the project are:

Himachal Pradesh Government Energy Development Agency (HIMURJA), a state nodal agency to initiate, implement, and monitor the techno-economic viability of the small hydroelectric project activities.

Himachal Pradesh State Electricity Board (HPSEB), accords techno-economic clearance to the project, purchases power from the project.

Himachal Pradesh Pollution Control Board (HPPCB), a regulatory body to monitor environmental impacts and environmental management of industries, accords clearances for setting up of industries in the state after ensuring adherence to the statutory regulations. Also gives consent to start the operation of the project if it satisfies with the environmental management and pollution control measures

Irrigation Department of Himachal Pradesh, accords clearance for utilizing water resources in Himachal Pradesh state.

Revenue Department of Himachal Pradesh, gives consent to establish the project and registers the project in revenue records of the Himachal Pradesh state.

Forest Department of Himachal Pradesh provides permission for utilizing forestland for construction of the project.

Local Village Panchayat accords permission for setting up of the project under the jurisdiction of the village.

Stakeholders' involvement

Power Purchase Agreement (PPA) is yet to be executed with Himachal Pradesh State Electricity Board (HPSEB) and firm power purchase price is yet to be ascertained.

The project has obtained Environment and Forest Clearance from Ministry of Environment & Forest, Govt. of India and State Government of Himachal Pradesh.

The project has obtained clearance from Himachal Pradesh State Pollution Control Board (HPPCB).

The project has obtained required clearance from HIMURJA for setting up the project in Himachal Pradesh using hydro potential and has already signed implementation agreement.

Stakeholders' comments

All stakeholders have issued their clearance, consents, approvals, suggestions for setting up the project and no comments were received against the setting up of the project. The project proponent is yet to execute power purchase agreement with HPSEB.

G.2. Summary of the comments received:

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No negative comments are received on the project activity, which is evident from the licences / approvals / clearances accorded to the project activity by the stakeholders.

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

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No comments received; hence no report is applicable.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the parties included in annex - I is involved in the project activity