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:

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Upper Awa small hydroelectric project (5 MW), Himachal Pradesh, India

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

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The purpose of the project activity is to install a small hydro power plant with an installed capacity of 5 MW in Kangra District, Himachal Pradesh state in Northern India to generate electricity using hydro potential available in Awa Khad, a tributary of river Binwa in Beas[1] basin of Kangra District of Himachal Pradesh State. The generated electricity will be exported to Himachal Pradesh State Electricity Board (HPSEB), a state owned power utility looking after electricity generation, transmission and distribution.

The Gross annual generation from the proposed power plant shall be around 35.55 GWh and the annual export to the Northern Regional grid shall be 32.706 GWh.

The power generation is carried out through sustainable means without causing any negative impact on the environment and in the process supports climate change mitigation as it leads to emission reductions of 274,690 tonnes of CO_2e over the crediting period of 10 years.

The turbine in the powerhouse generates power at a voltage of 3.3 kV which is stepped up to 33 kV before wheeled to the transmission line.

Project's contribution to Sustainable Development

The various sustainable development criteria as required by the CDM National Authority in India addressed by the proposed project are:

Social well being

- The proposed project is in rural area which doesn't have any proper roads, infrastructures and other basic civic amenities. By setting up the project in this area, the project activity would help creates infrastructure in the area which may lead to improving the quality of life of the local communities.
- The project leads to alleviation of poverty by generating direct and indirect employment during construction of the project as well as during operational lifetime to the local population. During construction period the peak level employment would be for about 1000 people and during regular operations the permanent employment would be to an extent of 30 persons.
- The proposed project will lead to provide opportunity to both genders of humankind, which will improve the gender equity among the peoples.

[1] Beas is one of the major rivers of North India

Economic well being

- With rising hydropower generation and improving efficiencies in distribution of electricity this project supports to offer energy at stable prices for industrial development.
- The project would bring in additional investment to the region which gives financial returns to the local entities which otherwise would not happen in the absence of the project.
- The proposed project will also result in a positive impact on balance of payments.

Environmental well being

- Since the project utilizes only hydro potential available in the river for power generation, the project does not lead to any GHG emissions.
- The project is run of the river scheme, which does not involve any impounding of water hence no submergence of forest is likely. Also there is no habitation on the banks, hence no resettlement and rehabilitation activity is necessary.
- The project leads to utilization of environmentally safe and sound technologies in small hydroelectric power sector.
- The constructions of this project neither alters nor contributes to raising of water level in the stream thereby do not alter the present conditions of local flora and fauna, if any.
- Dependence of kerosene and fuel wood by the local people will be replaced by supply of stable grid power by the proposed project activity which will also improve their health.
- 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.

Technological well being

- The project will result in utilization of environmentally safe and sound technology in small hydroelectric projects. Further the project demonstrates the harnessing the hydro potential and setting up new projects in unused watercourses.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
India (Host)	Astha Projects (India) Limited	No
	Zenith Corporate Services (P) Ltd.	

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

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The proposed project is run-of-river scheme and involves construction of a raised drop type trench weir across the stream at an elevation of 2210 m, intake chamber, desilting chamber, power channel in the form of cut and cover type, forebay, penstocks, power station and the tailrace discharging water back into the river. The project comprises two identical power-generating units of 2500 kW capacities each. Power will be generated at a lower voltage, which will be stepped up to higher voltage level within the project boundary to facilitate export of power to Himachal Pradesh State Electricity Board. The powerhouse is equipped with two Pelton wheel turbine shafts with 2.5 MW each, generates power at voltage of 3.3 KV and will be stepped up to 33 KV before wheeled to the transmission line.

Hydrology

Catchment area at diversion site	: 18 Sq. km
Design discharge	: 1.14 Cumecs
Gross head	: 528 meters
Net rated head	: 518 meters

Plant Equipment

Type of hydro turbine	: Pelton Wheel
Type of generator	: Synchronous, brushless
No. of generating units	: 2Nos.
Capacity of each generating unit	: 2.5 MW
Generation voltage	: 3.3 kV
Grid interfacing voltage	: 33 kV
Frequency	: 50 Hz

Energy

Expected annual generation	: 35.55 GWh
Annual export to the grid	: 32.706 GWh

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

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A.4.1.1. Host Party(ies):

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India

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

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Himachal Pradesh

A.4.1.3. City/Town/Community etc:

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District : Kangra
Tahsil : Palampur
Village : Kalani

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

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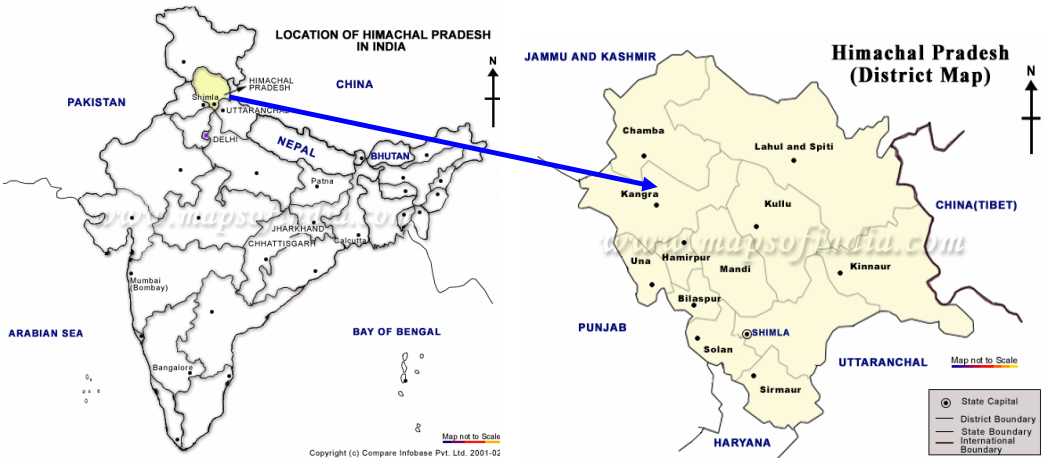
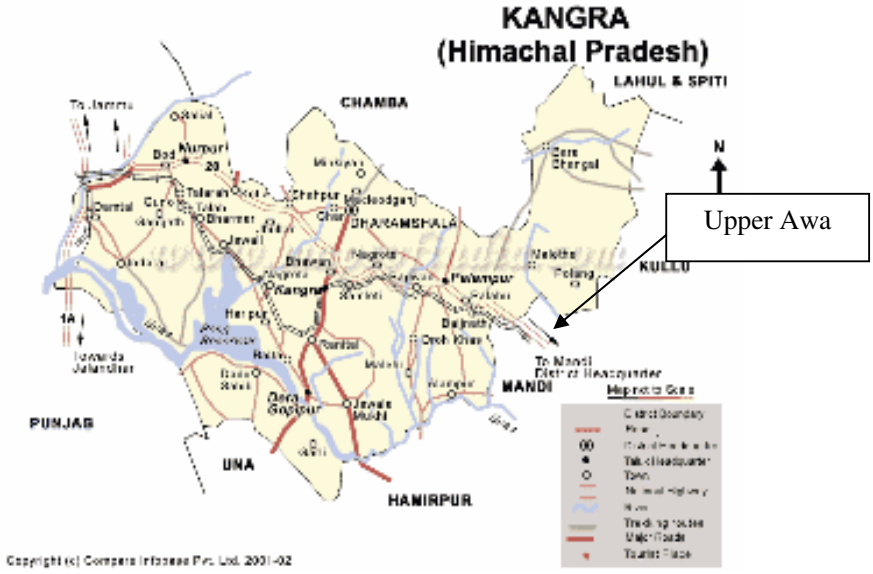
The CDM project is a small hydroelectric project located upstream of the river Awa Khad, near Kalani Village of Kangra District in Himachal Pradesh.

The road access to the project site is available up to village Spadeu from Palampur and from there an approach road is required to be constructed to reach the project location. Palampur is about 118 km from Pathankot in Punjab state and about 220 km from Shimla, the state capital. Nearest railway station is 16 km away at Maranda.

Geographical location of project is between longitude 76^0-35' E and 76^0 -36' E and latitude 32^0-8' N and 32^0-9' N.

The location maps of the project are furnished below





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

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The project activity utilises hydro potential for power generation and exports the generated power to the Northern grid. Since the project capacity is less than 15 MW, this project meets the criterion of small scale CDM project activity and the indicative simplified modalities and procedures can be applied. Accordingly the project activity falls under:

Type I - Renewable Energy Project
Category I.D. - Renewable electricity generation for grid

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 is located in Himachal Pradesh state which is a part of the Northern Regional grid, which is fed by a mix of fossil, nuclear and non-fossil fuel based generation sources. As per the latest records of power generation, the share of thermal power is around 74%. The per capita energy demand of the country is increasing rapidly and will lead to more electricity shortages in future which may push the decision making national and local authorities to opt for conventional methods to meet the growing demands. Also the harnessed potential of renewable energy sources like solar, wind, tidal, geothermal etc. is very low in comparison with growing energy demand.

As per NREB Annul report 2005-06, the electricity supply position in the Northern region is deficit by 12.68% (Peak) and energy shortage by 11.51%. Further, the growth rate in peak power is around 8.34%. To meet the present deficit and the anticipated growth, about 3500 MW needs to be added to the installed capacity each year. Present planned capacity additions will not be sufficient to meet this energy demand and it is most likely that only fossil fuel fired power stations would contribute to major part of the future capacity additions.

Thus, it can be safely concluded that the proposed project would help in reducing GHG emissions by carbon intensive sources. In the absence of the project, these emission reductions would not have occurred.

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

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The project activity will export 32.706 GWh to the regional grid after auxiliary consumptions. The average estimated amount of emission reductions would be 27,469 tCO_2 per annum and 274,690 t CO_2 for the crediting period of 10 years. An annual estimate of emission reductions due to the proposed CDM project activity is provided below.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2008	27,469
2009	27,469
2010	27,469
2011	27,469
2012	27,469
2013	27,469
2014	27,469
2015	27,469
2016	27,469
2017	27,469
Total estimated reductions (tonnes of CO_2 e)	274,690
Total number of crediting years	10
Annual average over the crediting Period of estimated reductions (tonnes of CO_2e)	27,469

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

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The total cost of the project is estimated as Rs.291.7 million. The financing of the project is through debt financing and equity capital. and does not include any public funding from Annex I countries. Hence, the project activity does not involve any public funding from Annex 1 countries.

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 proposed small scale project activity is a stand alone project and is neither debundled one of a larger project activity nor bundled to form a larger project activity. Proponents have not registered any part of this activity in the past and no other small scale CDM project activity based on hydroelectric power has been registered in one Km vicinity of the project site.

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 electricity generation for a grid system, which is also fed by both fossil fuel fired generating plants (using fossil fuels such as coal, natural gas, diesel, naphtha etc.) and non fossil fuel based generating plants (such as hydro, nuclear, biomass and wind). 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 coefficient suggested are

29 (a). The average of the approximate operating margin and the build margin.

29 (b). The weighted average emissions (in $kgCO_2/kWh$) of the current generating mix.

Grid system and the baseline methodology for the proposed project activity are described below.

Grid System

The project proponent has considered regional grid as the appropriate electricity system for the project activity.

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 kgCO2e/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. 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. Hence, the weighted average emissions of the generation mix will represent the carbon intensity of the grid system.

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 in the year 2001 i.e. 10,000 MW through renewable energy sources by the year 2012. Northern Region is expected to add about 2784[2] 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[3], 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 build margin (Option 29.a of simplified baseline methodologies). Hence, the baseline methodology per 29.b. is appropriate to the proposed project activity. Thus the calculated emission coefficient based on weighted average emission is 839.88 tCO_2/GWh.

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 5 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 procedure 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.

[2] 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.

[3] 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 area where the project is proposed is an under-developed area requiring development initiatives. There are no infrastructure or proper amenities for the local people. There is no access available to reach the project location. Approach road is being constructed for a length of 4.5 km from the village upto power house. Since the head available for the project is very high at 550 m and since there is no access to reach weir site as well as water conductor system, a rope way is proposed for movement of civil material to the high altitude. If construction of road for such high altitude is planned, the local environment will get disturbed as construction of a road involves heavy excavation. The further difficulty for the project is that the construction material has to be moved from the forebay to the weir site by Mules. Additionally Mule paths are required to be laid for movement of these mules. In view of these difficulties, the construction material cost is very high. For instance the cost of a sand bag of 100 kg is Rs.6, but the cost of transportation is Rs.120 per trip due to use of Mules.

Approach road during construction stage

Approach road during construction stage

The proposed project activity involves construction of powerhouse in a hilly terrain with loosely held rocks which poses problems during construction and involve additional investment to pass through the obstacles such as landslides. Heavy snowfall occurs in the period Jan-Feb when no construction activity is possible. Further glaciers sliding will happen during March and April. The area receives highest rainfall in July and August as it falls in Dharmshala range of hills. Construction of the project in the hilly terrain will increase the man-days required for construction and the project construction period will be longer. As there is no communication system available in the area the promoters have to invest additional funds for creating communication facilities.

Hilly Terrain with loosely held rocks

The project promoters have to make additional investments to develop the necessary infrastructure facilities indicated above before implementation of the project. Hence, the project activity involved investment barriers.

The project faces another serious barrier with respect to power evacuation facilities.

There are no transmission lines available for the project for evacuation of power generated by the project activity. The project proponents have to lay transmission system for a length of 34 kms to connect to the 33 kV substation at Palampur. An investment of Rs.60 million is estimated to be incurred and is proposed to be shared by five project developers including the project proponent. Even with sharing, the project proponent is required to invest Rs.12 million for the evacuation system. Though it is the responsibility of the government to provide necessary transmission system, as considerable delay is expected where the former undertakes the work, the project proponent initiated the work of laying of transmission system. In

the event of other project proponents not sharing the cost, there will be substantial additional burden on the project proponent for establishing the transmission lines.

Prevailing practice:

In the Indian power sector, the common practice is investing in 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)[4] the total installed capacity of small hydroelectric projects is only at 2333 MW[5] including projects under construction where as the India's total installed capacity is around 124287 MW [6]as on 3rd April, 2006. This shows that investing in the small hydroelectric sector is not a common practice and could not diffuse in the small hydroelectric sector.

Even in Himachal Pradesh against an estimated hydro potential of 20,386 MW, the share of small hydro projects is identified at 750 MW (source: www.hpseb.com/hydro_potential.htm). It is also observed from the statistics available from HPSEB that the projects implemented under small hydro category is around 110 MW which forms negligible %age of the total hydro potential in the State. This is another indication of the barriers the investors are experiencing for setting up of small hydro projects.

Institutional barriers:

There is always a possibility of change of policies applicable for hydro projects. These could be with respect to power purchase, conditions for implementation etc. Obtaining all the clearances will normally take 2-3 years before commencing the project implementation.

Other barriers:

Proposed projects face other barriers related to various risks as given below.

Geological risks: The location of project activity falls under seismically active zone V. The project site are located close to the epicentre of Kangra earthquake which occurred in the year 1905 and also the recent earthquake in 2005 that rocked the region. The possibility of geology changing frequently cannot be ruled out in this area, which may impose severe obstructions in the functioning of weir, water conducting system, powerhouse and other structures. Therefore the proposal does not offer a favourable location for investors under business as usual scenario.

Hydrological risks: Proposed projects are on a small stream with a very limited water flow and the power generation is possible whenever there is water flowing in the stream. Water flow is estimated based on Baira Nala located at a distance of 15 km.

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

The actual gauge data is not available for the river. Usually for a high head scheme the minimum amount of water available for power generation plays a significant role in the power generation. The dependability has been arrived for various flows based on the data available for nearby catchments. This is a risk as the nearby catchments characteristics such as run-off, absorption, ice, etc. are not exactly studied. Hence, a possibility of error in the calculation of lower discharges cannot be ignored for energy calculations and lack of exact data on flows is a barrier for investment.

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. Flash floods have been observed at some of the places recently in the hills of Himachal Pradesh. This is a potential risk for the project investors.

Royalty charges: Project proponents need to pay royalty charges in the form of free power to an extent of 12% to the Govt. of Himachal Pradesh for utilising water resources from the stream. The royalty charges may be subjected to revision from time to time and there is an uncertainty with regard to the operational economics of the project. Any upward revision will seriously affect the project's viability.

Hence, the proposed project is additional and not the same as the baseline scenario and would not have occurred with out the CDM. CDM revenues are expected to leverage the project economics in case of any unforeseen outages, which may be resulted due to the above uncertainties, and also CDM revenues will help the project proponents to overcome some of the barriers.

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:

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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 under construction the project boundary considered is that encompasses that the diversion structure, power canal, penstock, powerhouse, power evacuation system and tail race.

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

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As explained in section B.2 the project activity is generation of electricity for a grid system which is also fed by other fossil fuel based generating units. Hence the applicable baseline methodology for the proposed project activity is as per clause 29 of indicative simplified baseline and monitoring methodologies, which states that the baseline is kWh produced by the renewable generating unit multiplied by emission coefficient (measured in kg CO_{2e} / kWh).

The baseline is estimated using the method specified under 29.b i.e. weighted average emissions of the current generating mix, which is considered appropriate to the project activity.

Date of completion of the baseline : 13/05/2006
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 a project participant.

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

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

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

>>

01/12/2005

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

>>

30y

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:

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

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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:

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The project activity is generation of electricity using hydro potential and exporting the same to a grid system that is also fed by other fossil and non-fossil sources. Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity.

Hence, emissions reductions are related to the electricity exported by the project and the actual generation mix in the grid system. Since, the baseline emission factor is estimated based on the weighted average emissions of the current generation mix and the same is used as the constant baseline for the project activity during the crediting period, monitoring of actual generation mix in the grid system is not required. Hence, the data to be monitored to ascertain emissions reductions out of the project activity is only the energy generated by the project. No leakage is identified by the project proponents due to the project being run-of-the-river hydroelectric scheme.

Hence, the proposed methodology well suits the project activity.

D.3 Data to be monitored:

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This monitoring plan requires monitoring of the power exported to the grid system i.e. Northern Region grid system and the emission factor of the northern region grid system. Necessary documents required for verification of the data will be maintained for archiving at any time. 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.

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

ID number	Data type	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	Power exported to grid.	KWh	m	Monthly	Full (100% during the month)	Paper (Only sales records can be verified)	2 years after last verification	Required for estimation of baseline emissions
D.3.2.	Emission factor	Grid emission factor	tCO_2/GWh	c	Yearly	Full	Paper	2 years after last verification	Calculated as the weighted average of the generation mix during the year using the formulae described in Section E.1.2.4. Northern Region is the reference region. This data item is required for estimation of baseline emissions and emission reductions

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

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Data item	Uncertainty level of data (High / Medium / Low)	QA / QC procedures planned for the data items
D.3.1.	Low	This data item 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 measurements 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:

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This monitoring plan is developed in accordance with the modalities and procedures for small-scale CDM project activities and is proposed for grid-connected small hydroelectric project being implemented in Himachal Pradesh in India. The monitoring plan, which will be implemented by the project proponent, i.e. Astha Projects (India) Limited describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

Project Management

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the Board of Directors. The Boards may delegate the same to a competent person identified for the purpose. The identified person will be the in charge of GHG monitoring activities and necessary reports will be submitted to the management i.e. Board of Director or its Committee for review.

The designated manager will be assisted by a team of experienced personnel in disciplines such as mechanical and electrical with experience in plant operation, measurements and management. The primary responsibility of the team is to measure, monitor, record and report the information on various data items to the General Manager, in accordance with the applicable standards. Periodic calibration of various instruments used in the monitoring of GHG related data and record keeping of the same also will be the responsibility of the team

The responsibility of review, storage and archiving of information in good condition lies with the designated manager. The concerned manager will undertake periodic verifications and onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions.

The company may introduce an internal audit system for the GHG compliance. Internal auditing will be carried out as per the monitoring schedule and whenever necessary. An internal audit report will be prepared for review by the Board of Directors which will be later submitted for verification by an independent entity (DOE). Board of directors will examine the internal audit reports and will in particular

take note of any deviations in data over the norms and monitor that the corrective actions have resulted in adherence to the standards.

Monitoring Requirements

The monitoring plan includes monitoring of single parameter i.e. the energy fed to the Himachal Pradesh State Electricity Board (HPSEB) grid system. Emission reductions resulted from the project activity will be calculated using the energy fed to the grid in accordance with the calculations illustrated in Section E of the PDD. Emission reductions generated by the project shall be monitored at regular intervals. The crediting period chosen for the project activity is 10 years.

Monitoring of equipment comprises of energy meters, which will monitor the energy fed by the plant to HPSEB grid system by the proposed project. In accordance with the rules of HPSEB which will be incorporated in the PPA, project proponents have to install two energy meters one is main meter and the other is check meter. Project proponent will calibrate both the meters according to the procedures laid down by PPA. Project proponent will appoint a Designated Operational Entity (DOE) for verification of emission reductions and leakages resulted by the project activity at regular intervals. As per simplified modalities and procedures for small-scale CDM project activities, the same DOE who validated the project can undertake the verification of emission reductions and leakage generated by the project.

Methodology adopted for determining base line emission factor is the weighted average emissions of the generating mix in the northern grid system, which will represent the intensity of carbon emissions of the grid system. The baseline emission factor is calculated for the first year of the crediting period using the official generation statistics published by the Central Electricity Authority for the northern grid and projected as the fixed baseline for the crediting period of ten years. The assumption behind using the fixed baseline is that the grid emission factor will actually increase due to increasing dependence on fossil fuels to meet the growing energy needs and wide supply-demand gap. Hence, this monitoring plan does not require any data adjustments and uncertainties.

Leakage Monitoring

The proposed 5 MW Upper Awa hydro power project is renewable energy type and it utilizes flowing water for power generation and it does not involve any GHG emission. Leakage is not involved in the proposed project due to absence of transport of raw materials.

Data Recording and Storage

The net energy fed to the grid system by the project activity will be recorded by project proponents using either of the two meters (main meter and check meter) in the presence of the representative of HPSEB in a document whose format is acceptable to HPSEB. Representatives of both the project proponent and HPSEB will sign the document which will contain all details such as the equipment data, calibration status, previous reading, current reading, export, import, net billable units, date and time of recording etc. This document will be used as a basic document for monitoring and verification of the net energy exported to the grid. HPSEB will pay to project proponents based on this document.

The above document will be preserved for verification of emission reductions from the project, in safe storage. Supporting documents such as receipts of payments released by HPSEB will also be preserved in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later

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 a project participant.

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 that are suitable for the project activity.

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:

>>

Since, the proposed project activity is run-of-the river hydroelectric project; there will be no emissions by sources of greenhouse gases within the project boundary. 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

>>

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:

>>

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:

>>

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 of the Northern Region. For this purpose, the generation data published by Central Electricity Authority for the Northern Region was used. Baseline emissions were estimated as explained below.

i : Estimation of emissions from each power generating unit in the baseline

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

Baseline Emissions tCO_2	**=**	**Actual Generation GWh**	**x**	**CEF for fuel tC/TJ**	**x**	**Net Heat Rate TJ/ GWh**	**x**	**Conversion Factor $\frac{44}{12}$**

For the estimation of emissions from each baseline power generating unit, actual generation data monitored and published by Central Electricity Authority is used. IPCC default emission factors are used for CEF of each fuel type. Since, collecting heat rates for all baseline power generating stations is difficult, only net heat rates as specified by the CEA are considered. This is conservative and reasonable for a small-scale project activity whose generation is negligibly small compared to the total generation of the grid system.

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

ii : Total Baseline emissions

Total baseline emissions are estimated by summation of emissions from all baseline power generating units.

iii : Estimation of baseline or Emission Coefficient

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

Baseline Emissions Coefficient	=	Total Baseline emissions	/	Total net energy in the system
tCO_2/GWh		tCO_2	/	GWh

Using the above formula baseline / emission coefficient is estimated as 839.88 tCO_2 /GWh. Baseline information used in the above estimation is furnished in attachment.

iv : 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 iii: above) tCO_2/GWh	x	Net power export from the project GWh

Values obtained when applying the above formulae are provided in the following table.

Table E1. Estimation of emission reductions

No.	Year	Power export	Emission Factor	Emission Reductions
		GWh	tCO_2/GWh	tCO_2
1	2008	32.706	839.88	27,469
2	2009	32.706	839.88	27,469
3	2010	32.706	839.88	27,469
4	2011	32.706	839.88	27,469
5	2012	32.706	839.88	27,469
6	2013	32.706	839.88	27,469
7	2014	32.706	839.88	27,469
8	2015	32.706	839.88	27,469
9	2016	32.706	839.88	27,469
10	2017	32.706	839.88	27,469
Total Emission Reductions				**274,690**

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:

>>

Difference between E.1.2.4 and E.1.2.3, which represents emission reductions due to 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	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469
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	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469	27,469

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

>>

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2008	27,469
2009	27,469
2010	27,469
2011	27,469
2012	27,469
2013	27,469
2014	27,469
2015	27,469
2016	27,469
2017	27,469
Total estimated reductions (tonnes of CO_2 e)	274,690
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	27,469

SECTION F.: Environmental impacts:

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

>>

Host party, Govt. of India, represented by the Ministry of Environment & Forests (MoEF), doesn't require any documentation on Environmental Impacts by the project activity. However, as required by the state government regulation, the project activity need to obtain clearance from the state Pollution Control Board (HPPCB) and as prerequisite for obtaining the clearance the project participants prepared documentation on various environmental aspects. It was demonstrated to the HPPCB that the project doesn't result in any negative environmental impacts, being a run-of-the-river small scale hydroelectric project. The documentation will be made available to the DOE for verification.

SECTION G. Stakeholders' comments:

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

>>

Requirements of stakeholders' comments

Government of Himachal Pradesh state had made it mandatory for all hydroelectric projects proposed in the region to go for public consultation before the start of implementation. The project data must be publicized by project participants in national and vernacular dailies inviting comments if any from the public for a period of 90 days. Based on the comments received during the public consultation period and the feedback from the project participants on how the public comments are addressed, the Government of Himachal Pradesh decides whether the project to be sanctioned or withheld.

Similarly, Electricity Regulatory Commission of Himachal Pradesh (ERCHP) makes a public announcement in local dailies inviting public comments on proposed new projects before according approval for the export of power to HPSEB grid and the tariff for the exported electricity. Comments if any can be submitted within 60 days of announcement. It considers public comments in its approval process before giving approval.

In addition to the above two public consultation processes, the project participants have to obtain approval from the local elected administrative body (Village Panchayat) representing the populace in the region where the project is proposed. NOC will be given by the Village Panchayat only after considering the views of local populace.

Any new project proposed in the region has to pass through the above three process before starting of the project implementation. Until otherwise they can't get the project implemented.

Identification of stakeholders

Thus the main stakeholders identified for the project are the local people residing around the project area, Village Panchayat, Government of Himachal Pradesh and ERCHP. Apart from them the other stakeholders identified for the project are:

Himachal Pradesh Energy Development Agency (HIMURJA), a state level nodal agency that initiates, implements, and monitors techno-economic viability of renewable energy project activities and accords licence for implementation.

Himachal Pradesh State Electricity Board (HPSEB), a state owned power utility and also an off-taker for the electricity generated in the state. Project participants have to enter into an agreement (Power Purchase Agreement) with HPSEB before establishing any electricity generation project (whose main activity is the export of power) in the state. HPSEB reviews all project documents and accords techno-economic clearance to the project and enters into agreement with project participants.

Himachal Pradesh Pollution Control Board (HPPCB), a state level regulatory body established to monitor environmental impacts and environmental management of industries. Any project developer or investor has to obtain prior clearance from HPPCB for establishment and operation of the industry. Without any clearance from the HPPCB project participants cannot implement any project in the state.

Irrigation Department of Himachal Pradesh, a state level institutional body that monitors water resources in the state. Project participants of hydroelectric projects must approach Irrigation department for utilising hydro sources and establishing hydroelectric projects. Without their consent, the hydroelectric project cannot utilise water resources in the state.

Revenue Department of Himachal Pradesh, gives consent to establish the project and registers the project in revenue records of the Himachal Pradesh state. Hence, Revenue Department of Himachal Pradesh is also considered as one of the stakeholders.

Forest Department of Himachal Pradesh, gives permission for utilizing forestland for construction of the project. Hence, if applicable, project participants need to obtain permission for the project.

Stakeholders' involvements

The project participants have completed all the public consultation processes through public announcements. Apart from the above, the project participants involved various stakeholders identified above. Project participants approached all the stakeholders directly with necessary documentation and held detailed discussions with them.

Stakeholders' comments

All stakeholders have satisfied with the project design and the documentation. They issued their clearances / consents / approvals for setting up the project. No negative comments were received against the project.

Govt. of Himachal Pradesh accorded license for the project activity.

ERCHP also cleared the project activity and a tariff policy has been applied to the project activity.

Himachal Pradesh State Electricity Board (HPSEB) has accorded permission for evacuation of power generated by the company. Power Purchase Agreement (PPA) will be executed before implementation of the project.

Environment and Forest Clearance has been accorded by the Ministry of Environment & Forests, Govt. of India and State Government of Himachal Pradesh.

The project got clearance from Himachal Pradesh Pollution Control Board (HPPCB).

The project was given clearance by HIMURJA for setting up the project in Himachal Pradesh using hydro potential.

G.2. Summary of the comments received:

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No comments were received for the project activity.

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

>>

Action taken report is not applicable as no comments were received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Participant – I

Organization:	M/s Astha Projects (India) Limited
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Building:	Plot No: 226, Phase-III, Jubilee Hills,
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E-Mail:	asthapower@rediffmail.com
URL:	--
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Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Keshav
First Name:	M.
Department:	--
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Direct FAX:	+91 - 40 – 23547700
Direct tel:	+91 – 40 - 23546500, 23546600
Personal E-Mail:	--

Project Participant – II

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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.