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:

>>
10 MW bundled Luni–2 & Luni–3 hydroelectric projects for a grid system, Himachal Pradesh, India

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

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The purpose of the 10 MW bundled Luni – 2 & Luni – 3 hydroelectric projects are to produce clean electrical energy in a sustainable manner, optimising the utilization of renewable hydro resource in order to contribute to meet the local power demand in a system already overwhelmed by power production by thermal power plants utilizing fossil fuels.

The bundled small hydroelectric projects Luni-2 & Luni-3 are proposed as run of the river schemes across Luni Khad, a tributary of river Binwa in Baijnath Tehsil, Kangra District of Himachal Pradesh. The proposed projects generates about 43.80 Gwh in which 40.30 Gwh will be evacuated to HPSEB substation under Power Purchase Agreement (PPA), thereby improving the quality and energy availability under the service area of the substation.

Since the project activities generates electricity through sustainable means, it will not cause any negative impact on the environment and there by contributes to climate change mitigation efforts.

View of project participant about the project activity's contribution to Sustainable Development

Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects.

1. **Social well being**
2. **Economic well being**
3. **Environmental well being**
4. **Technological well being**

The project activities contributes to the above indicators in the following manner.

a) The project activities results in alleviation of poverty by generating direct and indirect employment during construction of the project as well as during operation. The projects creates indirect employment opportunities for about 170 unskilled workers for a period of 18 months which otherwise would not have happened in the absence of projects. In addition, the projects creates direct permanent employment for about 35 persons for operation of the projects.

b) Project activities will be implemented in rural areas, and the nearby villages in the proximity of the project zones do not have proper roads and other infrastructure facilities. These villages get benefited by setting up these projects since project proponents will invest in transportation and communication facilities etc., as a part of the projects construction.

c) Project proponents will mobilise investment to the region to an extent of about Rs.507.10 millions (US $ 11.02 millions) which otherwise would not have happened in the absence of the project activities. This is a significant investment in a remote area often characterized by landslides due to heavy rains during the monsoon season.

d) These project activities results in extending the electric supply system to the remote villages. Generation from small/micro power station and feeding the power into local 33 kV substation will greatly improve the much needed assured quality power in the far-flung and isolated areas thereby opening up the economy and giving a boost to food and tourism industry which will cater jobs for local people.

e) Hydel generation can not only meets the growing needs of power for industry, agriculture and electrification, but also be the biggest source of income to the state by the way of sale of electricity to the neighbouring states.

f) More and more rural industries will be set up and new opportunities for development will be created as a consequence to the hydroelectric projects in the area. This will result in infrastructure development, which ultimately lead to the rural development and prevent the migration of rural poor people to cities.

g) The project will result in reduction of local air pollutant emissions (NO_x, SO_2, particulates, etc.) as well as greenhouse gases, by displacing thermal power generation. In addition, it will respect regulations on residual water flow and thereby avoid negative impacts on the fauna and flora in the Luni Khad.

h) The project will result in utilisation of environmentally safe and sound technologies in small scale hydroelectric power sector. Further the project demonstrates harnessing hydro potential in small rivulets and encourages setting up such new projects in future.

i) Since, the projects feeding the generated power to the nearest HPSEB substation, energy availability and quality of the power improves significantly under the service area of the substation.

In view of the above, the proposed project activities strongly contributes to the sustainable development.

A.3. Project participants:

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Name of the party involved ((Host) indicates a host party)	Private and/or public entity (ies) project participants	Kindly indicate if the Party involved wished to be considered as project participant (Yes/No)
India (Host)	**Private Entity:** Sri Sai Krishna Hydro Energies (P) Limited, Hyderabad	No

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

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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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State: Himachal Pradesh

A.4.1.3. City/Town/Community etc:

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District: Kangra
Tehsil : Baijnath

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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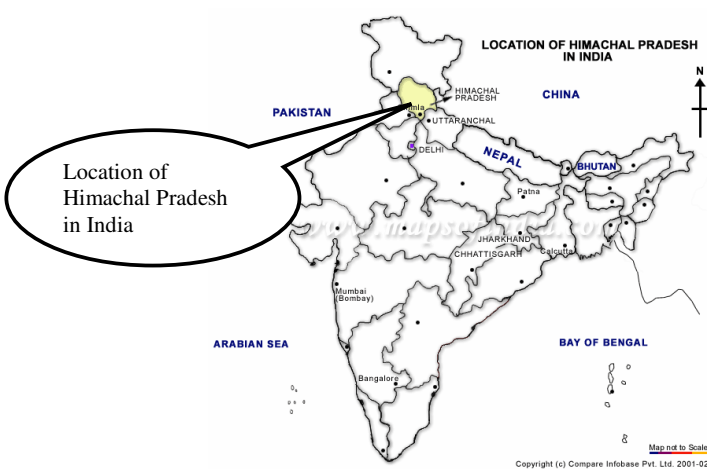
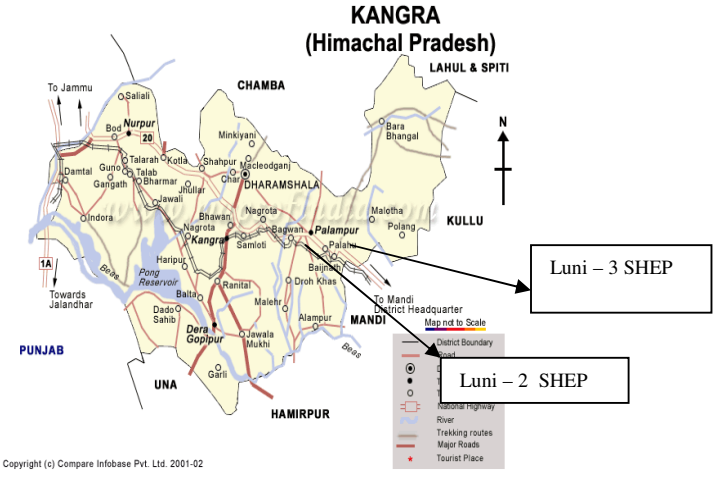
The proposed Luni – II small hydro project is a downstream development of proposed Luni-III small hydro project on Luni khad, a tributary of river Binwa in Kangra District, Himachal Pradesh. The Loaction could be approached through Baijnath - Deol road. Deol village is at a distance of 8 kms from Baijnath town. The project site is located at a distance of 18 kms from Baijnath, which is also the nearest railhead, on Pathankot – Palampur - Baijnath National Highway. The nearest airport is at Gagal (Kangra) located at a distance of 56 kms. The geographical co-ordinates of Luni II are $76^{o}41^{/}$ to $77^{o}47^{/}$ East (Longitude) and $32^{o}5^{/}$ to $32^{o}10^{/}$ North (latitude) and that for Luni III are $76^{o}45^{/}$ to $76^{o}47^{/}$ East (Longitude) and $32^{o}11^{/}$ to $32^{o}12^{/}$ North (latitude).

Physical location of the project is marked in the maps below.



Map 1: Location of Himachal Pradesh state in India



Map 2: Location of the project sites in Kangra District of HP

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

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

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

The project activities utilizes renewable hydro potential for power generation and exports the generated power to the grid. Since, the total capacities of the bundled CDM project is 10 MW, which is less than the qualifying capacity of 15 MW, the project activities are regarded as small-scale CDM project activities and UNFCCC indicative simplified modalities and procedures are applied.

Technical details of the project activities

The projects are designed to generate electricity for grid system using available water sources. The technology of 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 envisaged for the proposed CDM project activities.

The proposed projects shall use the potential energy in a flowing river by diversion weirs for running Pelton Wheel turbines to generate power. The components involved in each of the hydro electric schemes consists of construction of a raised drop type trench weir across the stream at elevations, intake chamber, desalting tank, cut and cover type channel, fore bay, penstocks, power house and the tailrace discharging water back into the river. 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 total capacities of the turbine generators are 10 MW, which generates electricity at 3.3 kV level and evacuated at 33 kV level. It is anticipated that the plants can operate at a Plant Load Factor (PLF) of 50%. The annual export to the regional grid is 40.30 GWh from both of the hydroelectric projects.

Table A.1: Technical specifications of the some of the important items of plant and machinery:

Parameter	Luni - II	Luni - III
Hydrology		
Design Discharge	1.98 cumecs	1.32 cumecs
Gross head	302.00 m	448.13 m
Net rated head	292.75 m	441.11 m
Plant Equipment		
Type of Hydro turbine	Pelton Wheel	Pelton Wheel
Type of generator	Synchronous, Brushless	Synchronous, Brushless

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 Htz	50 Htz
HPSEB substation	132/33 kV at Dehan	132/33 kV at Dehan
Energy		
Gross energy generation	21.9 GWh	21.9 GWh
Annual export to the grid	20.15 GWh	20.15 GWh

Demonstration for being with in the limits of SSC through out the crediting period

The water and power studies carried out for these two projects demonstrate that the project activities 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 have established the envisaged capacities of the plants. The net heads available have been estimated as 292.75 m (Luni – 2) and 441.11 m (Luni - 3). Based on the head available and discharge, the optimum capacities of the power plants have been envisaged at 5 MW each.

The capacity of the bundled CDM project is 10 MW. This is below the 15 MW limit[1] of output-capacity for small-scale projects and therefore the project qualifies as a small-scale CDM project. There is no possibility of exceeding the limits of small-scale CDM project activities during the crediting period and the project activities will remain as small scale project activities 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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Project activity and baseline scenario:

The proposed project activities are the installations and operations of a bundled 10 MW run-of-the-river hydro power station. The project activities will supply its power to the Northern Grid of India, leading to displacement of carbon-intensive electricity by electricity from a renewable energy source. Implementation of the project activities are scheduled for completion by May 2007. The project activities will start generating emissions reduction from June 2007.

The baseline scenario is the production of an equivalent amount of electricity by other power stations in the Northern Grid. The associated emissions are calculated based on the net amount of electricity fed into the grid, and the simple weighted average emission factor for that grid. The project activities neither results in any direct emissions of greenhouse gases nor in any leakage outside the project boundaries.

[1] In accordance with the simplified modalities and procedures for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3): http://cdm.unfccc.int/Reference/Documents/AnnexII/English/annexII.pdf

Additionality:

The project activities are not the baseline scenario, and the emission reductions would therefore not occur in the absence of the project activities. The project activities are not required by law, and the national and state policies in place are not sufficient to make the projects commercially viable on its own.

Most importantly, the project activities faces barriers, which in the absence of CDM would be prohibitive. These barriers include:

- High specific investment cost;
- Remote location combined with lack of infrastructure and qualified labour force;
- Significant risk of cost overruns and delays in the construction phase, due to difficult terrain and geology and high elevation;
- Proven risk of earthquakes, flash floods and land slides with potentially devastating impact on the project infrastructure;
- Lack of comprehensive hydrological data;

In addition, prevailing practice is a key barrier for the project activity. Small-scale hydro projects are neither a common practice in Himachal Pradesh nor in the Northern Region of India. Instead, the focus of generation is on large-scale thermal stations and, in the state of Himachal Pradesh, on large hydro. Very few small-scale hydro projects are in operation in the state today, despite the large potential for such schemes. The existing small hydro schemes are mostly government-owned and quite old. Of the few small scale projects that have been taken up recently by the private sector, the majority is known to rely on the CDM, and several have already been CDM-registered.

CDM will help to make the proposed project activities viable. The CDM revenues will help to deal with the various risks described above. In addition, CDM revenues are in hard currency and come typically from CER buyers with a good credit rating. This helps to mitigate the credit and currency risks associated with a publicly owned Indian power off-taker.

For details on the baseline, additionality and national / sectoral policies, please refer to Sections B.2 and B.3.

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

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Emission reductions due to the project activities depend on the energy fed to the Northern Regional grid and the content of fossil fuel based generation in the Northern grid system. Hence, power fed to the regional grid and the generation mix in the baseline region becomes the basis for estimating emissions reductions.

The expected emission reductions are calculated based on the net electricity sales and simple weighted average emission factor[2] of 713.75 tCO_2/GWh for the Northern Grid. The resulting emission reductions are 28,761 tCO_2 / annum, which is 287,610 tCO_2 certified emission reductions (CER) during the chosen crediting period of 10 years. Annual estimates of emission reductions by the project activities during the crediting period are furnished below.

[2] "CO_2 Baseline Database" published by Central Electricity Authority (CEA), www.cea.nic.in

Table A.2: Annual estimation of Certified Emission Reductions (CERs)

S. No	Year	Annual estimation of emission reductions (tonnes of CO_2 eq.)
1.	2007	28,761
2.	2008	28,761
3.	2009	28,761
4.	2010	28,761
5.	2011	28,761
6.	2012	28,761
7.	2013	28,761
8.	2014	28,761
9.	2015	28,761
10.	2016	28,761
Total emission reductions (tonnes of CO_2 eq.)		**287,610**
Total number of crediting years		**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 eq.)		**28,761**

In the above table, the year 2007 corresponds to the period starting from 01.06.2007 to 31.05.2008. Similar interpretation shall apply for remaining years.

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

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The project activities 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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In accordance with Appendix C[3] of the Simplified Modalities and Procedures for Small-Scale CDM project activities "DETERMINING THE OCCURANCE OF DEBUNDLING", it can be confirmed that these project activities are not a debundled component of a larger CDM project.

No other CDM activity has been undertaken by the project participant, which is in the same project category and whose boundary is within 1 km of the project boundaries of these project activities at the closest point.

[3] http://cdm.unfccc.int/EB/Meetings/007/eb7ra07.pdf

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 Category Title: **Type I**, Renewable Energy project, Renewable Electricity Generation for grid.
Reference: **AMS I.D**, Version 09 (28th July, 2006)

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

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With a bundled capacity 10 MW, the proposed hydro project activities qualifies as small scale and therefore is eligible to use approved methodology AMS I.D. The application of the methodology is described below.

Selection and justification of calculation approach:

The project activities are located in the state of Himachal Pradesh which is part of Northern regional grid system. The boundary for determining the baseline emission factor is the Northern Region of India as defined by Central Electricity Authority (CEA).

The baseline emissions are calculated based on the net energy provided to the grid (in GWh /year), and an emission factor for the displaced grid electricity (in tCO_2 /GWh). AMS I.D requires that the baseline emission factor be calculated in a transparent and conservative manner, based on either

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

or

(b) The weighted average emissions (in $kgCO_2eq./kWh$) of the current generation mix. The data of the year in which project generation occurs must be used.

The baseline emission factor has been considered from the "**CO_2 Baseline Database**" published by CEA[4]. The emission factor published by CEA for the latest year 2004-05 is 713.75 tCO_2/GWh based on weighted average approach and 754.50 tCO_2/GWh based on combined margin approach. As required by the methodology, the project proponents, following conservative approach, have considered weighted average emission factor for determining the emission reductions.

Actual emission reductions from each of the two projects will be calculated ex post based on the actual baseline emission factor for each year.

[4] CO_2 Baseline Database,
http://www.cea.nic.in/planning/c%20and%20e/Govertment%20of%20India%20website.htm

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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a) Justification for application of simplified methodology to the project activity

The total capacities of the proposed projects are 10 MW and the project activities are generation of electricity for a grid system using hydro potential. Hence, the type and category of the project activities meets the criteria specified under I.D. in Appendix B of the indicative simplified baseline and monitoring methodologies for small scale CDM project activities as well as those related to demonstration of additionality for small-scale activities (Attachment A to Appendix B).

b) National Policies and Circumstances

National policy on Coal, Lignite, Oil and Natural Gas

The Ministry of Power (MoP), Government of India has set an agenda of providing power for all by the year 2012. To meet the present national deficit of 8.4 %[5] and to achieve the above target, about 100,000 MW of new capacity needs to be added by the end of 2012 to the existing installed capacity of 126,089 MW[6]. In line with the Five Year Plan system being followed by the Planning Commission of India, the MoP decided to add about 46,000 MW during the period 2002-2007 and about 61,000 MW during the period 2008-2012. Emphasis has been laid on setting up large pithead stations to avoid high costs associated with transporting high ash bearing Indian coal and over-straining the already stretched rail network.

`To push forward the power sector reforms further, the Government of India has opened up the coal sector for private participation. Captive coal mining is allowed by the Ministry of Coal to facilitate coal mining by power generating units for their fuel needs. In addition, coal imports are allowed for power projects. This has significantly strengthened the preference of the private sector for coal-based mega power projects over other energy sources.

The Government of India has also opened oil and natural gas exploration for private sector participation. In the oil and natural gas sector, both central sector and private sector organisations are involved and already exploring the potential available in India. The discovery of new reserves is not significant enough to meet the increasing demand for natural gas. As yet the natural gas consumption is limited to a small extent and significant investments are required for natural gas infrastructure.

Hydropower Policy in India and Himachal Pradesh

The grid electricity in India today is clearly dominated by thermal generation, predominantly coal. The overall nationwide mix of thermal to hydroelectric power stands currently at around 83:17[7] (Source www.cea.nic.in as on March 2006).

The National Policy on Hydropower Development provides for exploitation of untapped potential located in the Northern and North Eastern States. MoP has developed appropriate strategies to fully exploit the country's hydro potential and accords high priority for its development. MoP has identified some of the

[5] Page No: 3, CEA Report as on 30th June 2006. www.cea.nic.in/planning/POWER SCENARIO AT A GLANCE/ index.htm

[6] Page No: 3, CEA Report as on 30th June 2006, www.cea.nic.in/planning/POWER SCENARIO AT A GLANCE/ index.htm

[7] http://www.cea.nic.in/god/opm/Monthly_Generation_Report/18col_06_03.pdf

potential sites for hydropower development. However, the focus of these initiatives is clearly on large and medium-sized projects (Refer Table B.2).

The levels of industrialisation and power consumption in Himachal Pradesh are relatively low. The state is an important net exporter of electricity within the Northern Grid.

Power generation in Himachal Pradesh is today based exclusively on hydro power. Most of this generation comes from large stations with installed capacities between 100 and 1,500 MW. The total installed capacity of hydro power in the state was 1471.9 MW as of June 2006[8]. Thereof, only 89.5 MW[9] were small hydro schemes with a capacity below 25 MW

Likewise, the capacity additions in Himachal Pradesh in the 10th plan and 11th plan periods are exclusively focused on hydro. Table B.2 provides a breakdown of the capacity additions in the 10th plan and their status. The plan does not include any small hydro schemes in the state, except one unit of 8.7 MW.

HIMURJA Policy

Himachal Pradesh Energy Development Agency (HIMURJA) is the nodal agency of Government of Himachal Pradesh for development of hydro projects. HIMURJA's main objective is to promote projects less than 5 MW in order to exploit hydro potential and to harness clean form of energy by involving private sector participation. HIMURJA has framed elaborated guidelines for allotment of projects to the private investors and every investor would like to set up a small hydro project in the state has to follow meticulously the guidelines framed.

HIRMUJA has so far signed implementation agreement for about 64 projects for a total capacity of 186.35 MW. Out of these projects only 10 projects with a total capacity of 22.35 MW have been commissioned[10]

[8] Page No: 15, CEA Report as on 30th June 2006, www.cea.nic.in/planning/POWER SCENARIO AT A GLANCE/ index.htm

[9] www.hpseb.com/hydro_potential.htm

[10] www.himachal.nic.in/himurja/ongprojects..html

Table B.2 Capacity Addition during 10th Plan

(As per Planning Commission target for the state – Himachal Pradesh). Source: www.cea.nic.in

Project Name	Type	Status	Installed Capacity (MW)	Capacity Addition During Xth Plan (MW)	Benefits Shares of state (MW)	Commissioned/ slipped during 2002-2007 (MW)		Last Unit Commissioning Date/ (Likely Date of Commissioning)
CENTRAL-SECTOR								
NATHPA JHAKRI	H	S	1500.00	1500.00	547.00	COMM	1500.00	31.03.2004
TEHRI-ST-I	H	S	1000.00	1000.00	28.00			(JUNE,2006)
DHAULIGANGA	H	S	280.00	280.00	10.00	COMM	280.00	17.10.2005
DULHASTI	H	S	390.00	390.00	14.00			(JULY,2006)
CHAMERA-II	H	S	300.00	300.00	47.00	COMM	300.00	26.02.2004
TEHRI ST II PSS	H	S	1000.00	1000.00	28.00	SLIP	1000.00	(2009-2010)
KOTESHWAR	H	S	400.00	400.00	11.00	SLIP	400.00	(2007-2008)
RIHAND -II	T	S	1000.00	1000.00	33.00	COMM	1000.00	24.09.2005
SEWA ST.II	H	C	120.00	120.00	4.00	SLIP	120.00	(2007-2008)
RAMPUR	H	N	400.00	400.00	62.00	SLIP	400.00	(2010-2011)
UNCHAHAR III	T	N	210.00	210.00	8.00			(JULY,2006)
DADRI II	H	N	490.00	490.00	16.00	SLIP	490.00	(2011-2012)
BARSINGSAR LIGN	T	N	500.00	250.00	8.00	SLIP	250.00	(2009-2010)
KAHALGAON-II	T	C	1320.00	660.00	13.00	SLIP	160.00	IN ADD PROJ.
BARH	T	C	1980.00	660.00	20.00	SLIP	660.00	(2009-2010)
NORTH KARANPURA	T	N	1980.00	660.00	18.00	SLIP	660.00	(2011-2012)
TALA REPLACE.	T	S	1020.00	1020.00	52.00			(2006-2007)
	CENTRAL-SECTOR TOTAL:-				**919.00**			
STATE-SECTOR								
LARGI	H	C	126.00	126.00	126.00			(MAY,2006)
KASHANG-I	H	N	66.00	66.00	66.00	SLIP	66.00	(2010-2011)
SMALL HYDRO	H	S	8.78	17.00	17.00			
	STATE - SECTOR TOTAL:-				**209.00**			
PRIVATE-SECTOR								
BASPA-2 *	H	S	300.00	300.00	300.00	COMM	300.00	27.05.2003
DHAMVARI SUNDA	H	C	70.00	70.00	70.00	SLIP	70.00	(2010-2011)
	PRIVATE-SECTOR TOTAL:-				**370.00**			
	GRAND-TOTAL:-				**1498.00**			

c) Barrier Analysis

Under UNFCCC simplified modalities, project activity should seek to establish additionality of the project activity as per Attachment A to Appendix B, which lists 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.

Prevailing practice

In the Indian power sector, the common practice is investing in only medium or large scale power projects, both fossil fuel fired and hydro power. This 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.

There are three mean indicators proving that investment in small hydro power (defined as plants with a capacity not exceeding 25 MW) is currently neither a common practice in India in general, nor in Himachal Pradesh:

- The total contribution of small hydro to the overall power supply is very small;
- The available potential for small hydro has only been tapped to a small degree; and
- The few small-scale hydro plants existing in the project region (state of Himachal Pradesh) are different from the proposed projects with respect to capacity.

Each of these three indicators is analyzed in more detail below.

In order to demonstrate that the proposed project activities i.e. generation of electricity through two small hydro projects of 5 MW each, is not a common practice. Reliance has been placed on the published statistics in respect of installations of small hydro projects in India, in the Northern region as well as in the Himachal Pradesh in relation to the total installed capacity of power generation.

a) Contribution of small hydro to total power supply

The total installed capacity of power projects in India was 126,089 MW[11] as on 30th June 2006. Against this small hydro projects in operation in India was 1748 MW as on the same date, giving an idea of the contribution of small hydro projects in the total power generation at 1.38 %. This percentage is only related to the installed capacities. It is a well known fact that plant load factor of the small hydro projects is always less some times as low as below 30%, compared to approx. 70 – 90% for thermal plants.

In the Northern region, the total installed capacity of power plants is 33,957.1 MW[12] against small hydro installations of 525.72 MW[13]. This corresponds to a share 1.55% for small hydro. Out of the total installations of small hydro in Northern region, the contribution of Himachal Pradesh is to an extent of 112.2 MW[14] as per HPSEB or 0.33% of the total capacity in the Northern region.

Another interesting fact is that the installed capacity of hydro projects, basically large projects in India is 32,326 MW[15] against an installed capacity of small hydro projects to an extent of 1748 MW[16] accounting for about 5% of the total hydro capacity.

b) Tapping of Potential for Small Hydro

In Himachal Pradesh, the total hydro potential has been estimated at 20,400 MW, and the potential for small hydro projects (below 25 MW) at less approx. 750 MW[17]. However, the total installed capacity of small hydro power plants is today only 112.2 MW. 89.5 MW of these were constructed by the state power generator HPSEB over several years. The remainder was established under the HIMURJA program, partly as CDM activities (Table B.4). This means that the existing potential for small hydro in the state has today only been tapped to an extent of about 15% over several years, despite the relatively long history of hydro power technology.

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[12] Page No: 7, CEA Report as on 30th June 2006. www.cea.nic.in/planning/POWER SCENARIO AT A GLANCE/ index.htm

[13] Page No: 53, Table 9.2, Annual Report 2005-06, Ministry of Non-conventional Energy Sources, Govt. of India

[14] www.hpseb.com/hydro_ potential.htm

[15] www.cea.nic.in/planning/POWER SCENARIO AT A GLANCE/ index.htm

[16] www.mnes.nic.in/annualreport-04-05

[17] www.hpseb.com/hydro_ potential.htm

c) Analysis of Existing Plants in the State

The small hydro projects of HPSEB in operation are provided in Table B.3. The analysis shows that the majority of these projects were commissioned well before the year 2000. Given the public ownership and mandate of HPSEB, these projects cannot be directly compared with the proposed project activities. Today the focus of HPSEB is clearly on large-scale hydro projects. Schemes which are under execution by HPSEB are to an extent of 2720.50 MW out of which all the projects are large hydro projects (99%) (www.hpseb.com/hydro_potential.htm). Hence implementation of small-scale projects such as the proposed projects cannot be considered a common practice of HPSEB:

Table B.3: Details of small hydro projects in operation in Himachal Pradesh

S.No	Name of the Project	River/Khad	Owner	Commiss. Date	Capacity (MW)
	Yamuna Basin				
1	Andhra	Andhra	HPSEB	1987	16.95
2	Gumma SHP	Gumma Khad	HPSEB	2000	3.00
	Total:-				**19.95**
	Satluj Basin				
3	Rongtong	Rongtong	HPSEB	1986	2.00
4	Rukti	Rukti	HPSEB	1979 & 1980	1.50
5	Nogli Stage-I	Nogli	HPSEB	1963, 1969-70, 1974	2.50
6	Chaba	Nauti	HPSEB	1912 & 1919	1.75
7	Ganvi	Ganvi khad	HPSEB	2000	22.50
	Total:-				**30.25**
	Beas Basin				
8	Binwa	Binwa	HPSEB	1984	6.00
9	Baner	Baner	HPSEB	1996	12.00
10	Gaj	Gaj	HPSEB	1996	10.50
	Total:-				**28.50**
	Ravi Basin				
11	Gharola	Gharola	HPSEB	1975	0.05
12	Bhuri Singh P/House		HPSEB	in operation	0.45
13	Sal-II	Ravi	HPSEB	2000	2.00
14	Holi	Ravi	HPSEB	2004	3.00
	Total:-				**5.50**
	Chenab Basin				
15	Sissu	Sissu	HPSEB	in operation	0.10
16	Billing	Billing	HPSEB	in operation	0.20
17	Shansha	Shansha	HPSEB	in operation	0.20
18	Thirot	Thirot	HPSEB	1995-96	4.50
19	Killar	Mahal	HPSEB	1995-96	0.30
	Total:-				**5.30**
	G.Total				**89.50**

(Source: Himachal State Electricity Board, www.hpseb.com)

Apart from the above projects owned by HPSEB, HIMURJA the state nodal agency has facilitated implementation of small hydro projects with private participation. The list is furnished below in the Table B.4. As could be seen from the list the projects which are comparable with the project activity in terms of capacity are already registered for CDM. The few existing projects are not necessarily comparable with projects in the size range of 5 – 25 MW, because they involve a much lower level of financial and construction barriers.

Therefore, it is justified to say that small hydro projects of the proposed type are not a common practice in the region, which presents a significant barrier.

Table B.4 List of hydropower projects under HIMURJA[18]

S. No	Name of the Project	Capacity
1	Raskat	0.8 MW
2	Titang	0.9 MW
3	Dehar* [19]	5 MW
4	Maujhi* [20]	4.5 MW
5	Ching	1 MW
6	Manal	3 MW
7	Aleo* [21]	3 MW
8	Manjhal	1 MW
9	Baragran	3 MW
10	Salag	0.15 MW
	Total	**22.35 MW**

(Note: * Project activities which are registered with CDM Executive Board)

Investment Barriers

The projected investment in the project activities are about Rs. 507.10 millions. This comes up to Rs. 50.71 millions/MW. Its high specific investment cost, in combination with its small absolute size, is a key barrier, which prevents the project activities from being implemented by large power sector stakeholders such as National Hydropower Corporation (NHPC) and State Electricity Boards. These public stakeholders have a clear preference for least-cost generation options, i.e. large-scale hydro and especially thermal units.

In addition, the high specific investment costs are also a significant barrier for the (private) project participants, especially in combination with the various risks which can negatively affect the return on investment. These risks (or barriers) are detailed below.

[18] www.himachal.nic.in/himurja/ongprojects.html

[19] Reference No: 0035, 18th July 2005, http://cdm.unfccc.int/Projects/registered.html

[20] Reference No: 0098, 6th November 2005, http://cdm.unfccc.int/Projects/registered.html

[21] Reference No: 0244, 14th April 2006, http://cdm.unfccc.int/Projects/registered.html

Lack of Infrastructure

The projects location are underdeveloped hence infrastructure such as roads, electricity, communication, transportation and proper civic amenities are not available. The project promoters are required to develop these facilities investing substantial sum of money before implementation of the projects. Steel required will be brought from steel stockyard at Chandigarh, which is about 325 kms from the project sites. Cement required for project construction has to be procured from Barmana and Darlaghat, which are about 120 to 150 kms from the project sites. Thus, resulting in a substantial impact on the cost of these materials.

As the locations are far off and inaccessible it is difficult to provide necessary technical skills and spares in case of breakdowns, necessitating long shutdown requiring heavy expenditure and loss of revenue. Access to skilled manpower is difficult due to poor accommodation and transport facilities. The evacuation of the power generated by the projects to the grid is a major concern. The power generated has to be transmitted through long distances to the available grid/sub grid from the place electricity is generated.

Construction Risks

The proposed bundled 10 MW small hydro project involves construction of different components and needs to procure various raw materials for the same. The project proponents are facing several difficulties in procuring the materials as the transportation and storage involve huge investment and risk. To procure cement, steel etc. for the construction of civil work (diversion weir, intake structure, power house etc), trucks are used which have to travel around 150 to 350 kms from the project sites and whole load of cement is not advisable since it's a rain fed area and material may get damaged . Even the natural sand and coarse aggregate are not available economically in close proximity of the project areas. These shall be procured from quarries in Dharmshala, which is 45 kms from project site. Other materials such as lubricating oils etc. shall be procured from Palampur/ Kangra/ Pathankot These constructions involves labor working on hill slopes and has to be build everything manually so the labor would charge high costs for the work. This translates into risks with respect to possible cost overruns, but also possible delays in plant commissioning.

The evacuation of the power generated by the projects to the grid is a major concern. An 8.5 kms long transmission line from the power house to focal point switchyard at Kilwari and from there through double circuit 33 kV line to 132/33 kV substation of HPSEB at Dehan have to be constructed for the power evacuation. This also results an extra cost investment for the project proponent.

In addition, due to its elevation of power house, which is very high above sea level, the project sites experiences regular snow fall and sub-zero temperatures. As a result, work is hindered during winter season from December to March (approx). This again translates into risks of delay for the construction and start of revenue generation.

Earthquakes, Land Slides and Flash Floods

- *Earthquakes:* The project areas lies in highly seismic belt and within seismic zone V of the seismic zoning map of India. The project sites are located in Kangra valley, which lies in the epicenter tract of devastating Kangra earthquake of 1905. The magnitude of this earthquake was recorded as 8 on Richter's scale. The area is prone to repeated earthquake of rarely high intensities as indicated by recurrence of Dharamshala earthquake of 1978. The magnitude of this

earthquake was 5 on Richter's scale and epicenter lies in the vicinity of Dharamshala. From seismic zoning map of India (IS 1893-1975), it is seen that project areas lies in seismic zone where earthquake of intensity greater than IX mm scale are expected. As such project proponent will have to consider these issues while implementation of the project, which leads to higher investment.

- *Land Slides*: In the rainy season, heavy rain falls are common, resulting in a risk of land slides which can damage the access roads, power supply, and project infrastructure such as RCC laggings, steel ribs etc. The resulting damages are multiple and include delays in the construction, repair cost for physical damages, as well as lost revenues if plant operation is affected.

- *Flash Flood:* Luni Khad is a tributary of Binwa River. This khad has a history of flash floods which normally occur during rainy season (June - September). These floods have caused enormous damage in the past. This incidence of flash floods presents a significant risk and barrier for the project.

Lack of Hydrological Data

- There is no rain gauge station in the catchment of Luni – 2 and Luni – 3 hydroelectric projects. Rainfall data of nearby precipitation stations at Dharamshala/Palampur has been considered.

- Further there is no snow gauge data available in the Luni Khad valley. The data available in respect of rainfall/snowfall is too less to give any quantitative information regarding rain or snow that occurs over different part of the catchment.

- Discharges of Luni Khad have not been measured in the past and discharge data is available for two lean season i.e from November 2002 to May 2004.

- Long term flow series for Luni Khad has been developed from the long term data available of Neogal Khad which has a hydrologically similar and adjacent catchment.

The dependability factors for these projects such as various flows, mean rainfall are simulated from data which are not reliable and incomplete, where major risk is involved for investment as the nearby catchments characteristics such as run-off, absorption etc., are not available at the project planning stage.

Hence, the proposed projects are 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:

>>

In accordance with AMS I.D, the project boundaries encompass the physical, geographical site of the renewable generation source.

The project boundaries are therefore includes the physical boundaries around the catchment's areas, weirs, desilting tank, headrace tunnel, fore bay, penstock, powerhouse, tailrace and the transmission

system till the evacuation point. The power generated from these projects are metered and accurately quantifiable.

In addition, the project boundaries are also includes the connected electricity system, i.e. the Indian Northern grid, for the purpose of determining the baseline emission factor for displaced grid electricity. The Northern grid covers the following states: Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal and Chandigarh.

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

>>

The baseline for the project activity is constructed according to clause 9.b of AMS ID, Version 9. 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 the baseline 06/08/2006

Name of the person / entity determining the baseline: Zenith Energy Services (P) Limited, Hyderabad

Contact information of the above entity furnished below:

Organization:	Zenith Energy Services (P) Limited
Street/P.O. Box, Building:	10-5-6/B, My Home Plaza, Masabtank,
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/Zip:	500 028
Country:	India
Telephone:	+91- 40- 2337 6630, 2337 6631
Fax:	+91- 40- 2332 2517
E.Mail:	zenith@zenithenergy.com
Url:	www.zenithenergy.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Mohan
First Name:	Attipalli
Mobile	+91- 9849408485
Direct Fax	+91- 40- 2332 2517
Direct Telephone	+91- 40- 2337 6630, 2337 6631
Personal E.mail	mohan@zenithenergy.com

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:

>>
01/10/2005

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

>>
30 y – 0 m

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

>>
Fixed crediting period

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:

>>
01/06/2007

C.2.2.2. Length:

>>
10 y – 0 m

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 approved monitoring methodology applied for the project activity is "**AMS I.D -** ***Grid connected renewable electricity generation".***

This is in accordance with Appendix B of simplified modalities and procedures for small-scale CDM project activities. The reference to the monitoring is Para 13 of AMS I.D 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 activities are generation of electricity using hydro potential and exporting the same to the grid system, which is also fed by other fuel sources such as fossil and non-fossil types. Emission reductions due to the project activities are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the two projects and the actual generation mix in the grid system.

The project activity is generation of electricity using hydro potential and exporting the same to the grid system, which is also fed by other fuel sources such as fossil and non-fossil types. Emission reductions due to the project activities are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity and also related to the electricity exported by the projects and the actual generation mix in the grid system. The baseline emission factor is adopted from the "CO_2 Baseline Database" based on the weighted average emissions of the current generation mix for the fiscal year 2004/05 and will be updated ex-post during the crediting period. The data to be monitored to ascertain emission reductions out of the project activities are to measure the amount of electricity generated through energy meters and the emission factor each year based on data available form CEA. With this information, a reliable estimate of the amount of emission reduction can be made.

D.3 Data to be monitored:

>>

The following data is to be monitored to ascertain project emissions and emission 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	Gross Generation *	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by HPSEB
D.3.2	Power	Auxiliary Consumption *	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by HPSEB
D.3.3	Power	Power Import *	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by HPSEB
D.3.4	Power	Power Export *	kWh	m	Continuous	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by HPSEB
D.3.5	Emission Factor	Grid Emission Factor (EF)	tCO_2/ GWh	c	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	This data item is required for estimating the baseline emissions and emission reductions.

* The data variable will be monitored for both Luni -2 & Luni – 3 small hydroelectric projects.

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 & D.3.2	Low	This data item will be recorded at the project sites which are under the control of project proponent. The energy generated and consumed are measured using calibrated meters and recorded by project proponent. Records of measurements will be used for calculating net export to grid.
D.3.3	Low	This data will be recorded at the project sites and the energy imported is measured using HPSEB calibrated meter. Records of measurements will be used for calculating net export to grid. Sales bills/receipts may be compared as an alternative proof of the power imported from HPSEB grid.
D.3.4	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 emissions reductions. Sales bills / receipts may be compared as an alternative proof of the power exported to the grid
D.3.5	Low	Based on official data from CEA. The project participant has no influence on quality control procedures.

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:

>>

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 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 or it's Committee for review.

Monitoring Requirements

The monitoring plan includes monitoring of single parameter i.e. the energy fed to the HPSEB grid system. Emission reductions resulted from the project activities will be calculated using the energy fed in accordance with the calculations illustrated in Section E of the PDD. Emission reductions generated by

the projects shall be monitored at regular intervals. The crediting period chosen for the CDM project activity is 10 years.

Monitoring equipment comprises of energy meters, which will monitor the energy fed by the plants to HPSEB grid system by the proposed projects. In accordance with the PPA, project proponents have to install two energy meters one is main meter and the other is check meter for each of the two projects. 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 activities at regular intervals. As per simplified modalities and procedures for small-scale CDM project activities, the same DOE who validated the project can undergo verification of emission reductions and leakage generated by the projects.

Methodology adopted for determining base line emission factor is the weighted average emissions of the generating mix in the Northern regional grid system, which will represent the intensity of carbon emissions of the grid system. The baseline emission factor is adopted from the "CO_2 Baseline Database" published by CEA for the latest available year for the Northern grid and the same is used for the future projections; although this will be reviewed each year based on data published by CEA. The monitored data will be presented to the verification agency or DOE to whom verification of emission reductions is assigned.

Leakage Monitoring
The proposed bundled 10 MW Luni hydroelectric projects are renewable energy type and it utilizes flowing water for power generation and it does not involve any GHG emissions. No leakages are involved in the proposed activities.

Data Recording and Storage
The net energy fed to the grid system by the project activities 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 projects, 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 activities 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 Energy Services (P) Limited
Street/P.O. Box, Building:	10-5-6/B, My Home Plaza, Masabtank,
City:	Hyderabad
State/Region:	Andhra Pradesh

Postfix/Zip:	500 028
Country:	India
Telephone:	+91- 40- 2337 6630, 2337 6631
Fax:	+91- 40- 2332 2517
E.Mail:	zenith@zenithenergy.com
Url:	www.zenithenergy.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Mohan
First Name:	Attipalli
Mobile	+91- 9849408485
Direct Fax	+91- 40- 2332 2517
Direct Telephone	+91- 40- 2337 6630, 2337 6631
Personal E.mail	attipallimohan@gmail.com

The above entity is not 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:

>>

AMS I.D does not provide explicit formulae for the calculation of emission reductions. Section E.1.2 describes the variables and formulae used for these project activities.

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 bundled hydroelectric projects are zero CO_2 emissions; no specific formulae are specified for the applicable project categories.

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 leakages are applicable for the project activities, 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 activities are kWh produced by the hydroelectric projects 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.

The emission reductions for a given year are calculated as baseline emissions minus the project emissions and leakage:

$$\mathbf{ER_y = BE_y – PE_y - L_y}$$

Since the project emissions (PE_y) as well as the leakage (L_y) are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid, and the baseline emission factor. The latter is monitored and hence determined ex post.

$$\mathbf{ER_y = BE_y = EF_y \times EG_y}$$

Where,

ER_y - Emission reductions in the y^{th} year

BE_y - Baseline emissions in the y^{th} year

EF_y - Baseline emission factor for the project grid

EG_y - Power Export to the Grid in the y^{th} year.

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

S. No	Year	Gross Energy (GWh)	Export for Emission Reductions (GWh)	Emission Factor (tCO_2/Gwh)	Baseline Emissions (tCO_2)
1	2007	43.80	40.30	713.75	28,761
2	2008	43.80	40.30	713.75	28,761
3	2009	43.80	40.30	713.75	28,761
4	2010	43.80	40.30	713.75	28,761
5	2011	43.80	40.30	713.75	28,761
6	2012	43.80	40.30	713.75	28,761
7	2013	43.80	40.30	713.75	28,761
8	2014	43.80	40.30	713.75	28,761
9	2015	43.80	40.30	713.75	28,761
10	2016	43.80	40.30	713.75	28,761
Total Emission Reductions					**287,610**

In the above table, the year 2007 corresponds to the period starting from 01.06.2007 to 31.05.2008. Similar interpretation shall apply for remaining years.

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:

>>

Since the emissions from the project activities (including leakages) are zero, the emission reductions are equal to the baseline emissions in each year

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

>>

Emission reductions from two projects are

S. No	Year	Annual estimation of emission reductions in tonnes of CO_2 eq.
1.	2007	28,761
2.	2008	28,761
3.	2009	28,761
4.	2010	28,761
5.	2011	28,761
6.	2012	28,761
7.	2013	28,761
8.	2014	28,761
9.	2015	28,761
10.	2016	28,761
Total emission reductions (tonnes of CO_2 eq.)		**287,610**
Total number of crediting years		**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 eq.)		**28,761**

In the above table, the year 2007 corresponds to the period starting from 01.06.2007 to 31.05.2008. Similar interpretation shall apply for remaining years.

SECTION F.: Environmental impacts:

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

>>

As per the Ministry of Environment & Forest (MoEF), Government of India, Environmental Impact Assessment (EIA) studies need not to be done for the projects less than US $ 21.74 millions. Since the total cost of the proposed bundled projects are only US $ 11.02 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 implementation, the projects shall notify to the Himachal Pradesh State Environment Protection & Pollution Control Board (EPPCB) for necessary evaluation and approval.

Small-scale run-off the river hydroelectric projects has low impact on river flow volumes and all water diverted to the powerhouse is returned to main stream. Compared to thermal and nuclear establishment hazards, small hydropower hazard is almost zero. Project proponent has already got No Objection Certificate (NOC) from Irrigation and Public Health Department of Himachal Pradesh, Deol Gram Panchayat, 'Consent for Establishment' from Himachal Pradesh State Environment Protection & Pollution Control Board (EPPCB) and the remaining necessary permission/clearance will be obtained prior to the implementation of the projects.

Proposed projects will not result in resettlement and rehabilitation in project sites, as they are not under human habitation area. The scheme does not involve any impounding of water and hence no submergence or rehabilitation activities are needed. The projects shall not affect the aquatic life available in this stream, which at present is insignificant.

Beneficial impacts are envisaged on socio-economic conditions, as there will be rural and urban electrification. The industrial development may also take place, which will trigger the economic growth in the backward region of the state.

Soil conservation methods are also taken into account prior to implementation of the projects, so the proposed projects will not result in damage to soil profile in the construction phase. From the above discussions, it is evident that the proposed projects are not likely to have any significant adverse environmental effects during execution or after commissioning.

SECTION G. Stakeholders' comments:

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

>>
No specific public consultation / participation requirements are specified in Indian statutes for setting up of small-scale industries. However, there are certain procedural requirements, which every project investor needs to follow before implementing any project.

Before implementing any project, project investors / developers need to identify the stakeholders, prepare necessary documents, approach the identified stakeholders directly and obtain required clearances / approvals. The stakeholders after review of documents and investment profile, will accord approvals / licences or send comments in writing to project investors for further clarifications / corrections. In case they are not satisfied with the project design or they feel that the project impacts any of the local environment / social / economical environments, they will not issue clearances / approvals and stop the implementation of the project.

Government of Himachal Pradesh had made it mandatory for all the projects to go for public consultation before start of the project. It should be publicized in national and vernacular dailies and invites objections / comments from the public during a period of 60 days before issuing license. Based on the feedback the Government of Himachal Pradesh will decide whether the project to be sanctioned or withheld.

Identification of Stakeholders

Stakeholder Name	Function of Stakeholder	Description of Involvement
Himachal Pradesh Government Energy Development Agency (HIMURJA)	A state nodal agency and policy implementation body in respect of renewable energy projects in Himachal Pradesh. HIMURJA reviews the project documentation and accords clearance for utilizing renewable energy sources in the state.	Issues clearance for setting up the project in Himachal Pradesh utilizing hydro potential available at the proposed site.
Himachal Pradesh State Electricity Board (HPSEB)	The state owned electricity utility company that manages the electricity generation and distribution in Himachal Pradesh state. Any electricity generation project proposed in Himachal Pradesh shall approach HPSEB for power evacuation arrangements. Both HPSEB and the project proponent shall sign a Power Purchase Agreement, before implementing the project.	Accords techno-economic clearance to the project, purchases power from the project by executing Power Purchase Agreement to determine the tariff and other terms.
Electricity Regulatory Commission of Himachal Pradesh (ERCHP)	The state owned electricity regulatory body responsible for tariff fixation, grievance redressing etc. throughout the state of Himachal Pradesh.	Electricity Regulatory Commission of Himachal Pradesh (ERCHP) 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.
Himachal Pradesh State Environment Protection & Pollution Control Board (EPPCB)	A statutory local body that oversees the pollution control aspects in the state. Any project activity shall obtain clearance from the EPPCB before implementation.	Issues 'Consent for Establishment' before starting the construction of the project and issues 'Consent for Operation' before commissioning of the project.
Department of Irrigation, Govt. of Himachal Pradesh	Is part of Government and overseas utilization of water	Accords clearance for utilizing water resources in Himachal Pradesh state.
Ministry of Environment & Forests, Govt. of India	Part of Government responsible for overseeing utilization of forest land.	Provides permission for utilizing forestland for construction of the project.
Local Village Panchayat	Elected statutory body of the local populace	Accords permission for setting up of the project under the jurisdiction of the village

Stakeholders Involvements

Govt. of Himachal Pradesh
The company has entered into a Memorandum of Understanding (MoU) with Govt. of Himachal Pradesh on 29th November 2004.

Village Panchayat
Local populace, represented by the Deol Gram Panchayat, the elected administrative body of the village Deol where the projects are getting implemented, issued NOC (No-Objection Certificate) for both projects on 4th August 2005.

Irrigation Department
The Irrigation and Public Health Department of Himachal Pradesh has issued No Objection Certificate (NOC) for constructions of the projects vide **EE/IPHDP/WA/N.O.C./2005-5327-28** dated 12th July 2005.

HPSEB
Himachal Pradesh State Electricity Board (HPSEB) accords Techno-Economic Clearance for the projects vide **HPSEB/CE (P)/CC-Luni-II/2004-1476-85** dated 17th August 2005 for Luni-II SHP and vide **HPSEB/CE(P)/CC-Luni-III/2004-1496-1505** dated 17th August 2005 for Luni-III SHP.

EPPCB
Himachal Pradesh State Environment Protection & Pollution Control Board (EPPCB) has issued 'Consent for Establishment' vide **EPPCB/Luni-II SHEP – Kangra/2005/3460-65** dated 24th February 2006 and **EPPCB/Luni-III SHEP – Kangra/2006/3454-59** dated 24th February 2006 for 5 MW Luni – 2 small hydroelectric project and 5 MW Luni – 3 small hydroelectric project respectively.

Stakeholders' Comments

All stakeholders have issued their approvals/consents/licenses for setting up the projects and no comments were received on the projects.

G.2. Summary of the comments received:

>>
As yet no comments are received on the projects.

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

>>
As yet, no comments received and hence no action reports are applicable.

Annex 1

CONTACT INFORMATION OF PARTICIPANTS IN THE PROJECT ACTIVITIES

Organization:	Sri Sai Krishna Hydro Energies Private Limited
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E.Mail:	asthapower@rediffmail.com
Url:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Keshav
First Name:	M
Department:	
Mobile:	
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Direct Telephone:	+91- 40- 2354 6500, 2354 6600
Personal E.Mail:	asthapower@rediffmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the parties included in Annex - I is involved in the project activities.

Annex 3

References

a. For Baseline data:

The methodology adopted for the calculation of the baseline is "Simple Weighted Average of the Current Generation Mix". The baseline emission factor has been adopted from the "CO_2 Baseline Database" published by CEA.

http://www.cea.nic.in/planning/c%20and%20e/Govertment%20of%20India%20website.htm

b. For completing PDD:

1. Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
2. UNFCCC document: Clean Development Mechanism, Simplified Project Design Document For Small Scale Project Activities (CDM SSC-PDD), Version 02
3. UNFCCC document: Simplified modalities and procedures for small–scale clean development mechanism project activities
4. UNFCCC document: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, Version 09, 28th July 2006
5. Detailed Project Report (DPR) of the projects.

Annex- 4

Abbréviations

CEA	Central Electricity Authority
CFE	Consent for Establishment
CFO	Consent for Operation
CO_2	Carbon dioxide
EIA	Environment Impact Assessment
EPPCB	Himachal Pradesh State Environment Protection & Pollution Control Board
ERCHP	Electricity Regulatory Commission of Himachal Pradesh
GHG	Greenhouse gas
GWh	Giga watt hour
HIMURJA	Himachal Pradesh Government Energy Development Agency
HPSEB	Himachal Pradesh State Electricity Board
IPCC	Inter Governmental Panel on Climate Change
kWh	Kilo watt hour
MW	Mega watt
MNES	Ministry of Non Conventional Energy Sources
MoEF	Ministry of Environment & Forest
MT	Metric Tonne
PDD	Project Design Document
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change

Annex - 5

Monitoring Plan

All the parameters mentioned in the monitoring plan will be monitored in the plants. The entire process of monitoring will be made available in the required format during the verification process and for subsequent useful purposes. Energy exports, imports and auxiliary consumption, etc are being maintained in different formats.

The calibration of monitoring equipment will be maintained as per the requirement of HPSEB and the same will be done regularly. Power Generation, Import, Export & Auxiliary Consumption will be recorded daily and the same will be verified and approved by the Manager of the plants. These records are being sent to Head Office for review by the Managing Director and for corrective actions if necessary.

The plants will be equipped with energy meters/export meters for monitoring and control purposes. There are two energy meters at HPSEB sub station to measure the export power, namely main meter and check meter with 0.5 class accuracy. The energy meters shall be tested and calibrated utilizing a standard meter. The standard meter shall be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Himachal Pradesh as per terms and conditions of supply. The tests of meters shall be jointly conducted by authorised representatives of both the parties and the results and correction so arrived at mutually will be applicable and binding on both the parties. The energy meters shall not be interfered with, tested or checked except in the presence of representatives of company and HPSEB. If any of the meters is found to be registered inaccurately, the affected meter will be replaced immediately. The meters will be checked in presence of both the parties on mutually agreed periods. If during the test checks both the meters are found beyond permissible limits of error, both the meters shall be immediately replaced and the correction will be applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter.

Corrections in exported energy shall be applicable to the period between the two previous monthly reading and the date and time of test calibration in the current month when error is observed. Power generation, power export to the grid will be recorded at the plant from the two meters i.e main meter, check meter installed inside the powerhouse of the plant. However, for applying monthly bill to HPSEB the meter readings will be taken every month by HPSEB officials in presence of company representatives and readings will be jointly certified.

The following log sheets will be maintained for the critical equipment of the plant and readings are being recorded on day to day basis:

1. Turbine log
2. Electrical log

If both check meters fail to record or if any of the PT fuses are blown out, the exported energy will be computed on a mutually agreeable basis for the point of defect. Emission levels will be monitored as per the statutory requirement.