CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

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>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

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

Title : Sonna mini hydel scheme in Karnataka State, India.
Version: 03
Date : 25/03/2009

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

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Jasper Energy Private Limited is intending to establish a 10.5 MW small hydro project to utilise the water discharges from Sonna Barrage on Bhima River to generate electrical power for supply to the Karnataka State grid. The project will generate an average annual energy of 27.64 GWh, operating under a 10.77 m net head at a design flow of 112.42m^3/sec. The electricity generated will be exported to Karnataka Power Transmission Corporation Limited (KPTCL).

Bhima river is one of the major tributaries of river Krishna originating in Maharashtra and flows towards East and South-East before joining river Krishna. The Bhima river at the Sonna barrage site has large flows during the months of July to October every year and the flows dwindle rapidly after wards. The canal system of upper Krishna project left bank canal and the Indi Branch canals traverse in the part of catchment area of Bhima river. The regenerated water from these canal systems flows into the river and to the Sonna barrage site. The flows that pass through the proposed Sonna barrage to down stream reach of Bhima river are proposed to be harnessed for power generation.

The purpose of the proposed project activity is to produce clean electrical energy in a sustainable manner, optimising the utilization of renewable resource (water) in order to contribute to meet the local power demand from clean sources in a system already overwhelmed by thermal power production plants utilizing fossil fuels.

The project activity utilises potential energy available in flowing water for power generation. The process involved is converting the kinetic energy available in the water flow into mechanical energy using hydro turbines and then to electrical energy using alternators. Therefore, no fossil fuels are involved for power generation. The project operation will contribute to sustainable development substituting fossil fuel generated power, reducing emissions of GHGs while responding to increasing energy demand, contributing to stabilize the price of power to consumers, reducing the dependence on fossil fuels.

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

Government of India have evolved sustainable development priorities for the country with a focus on "climate justice" wherein it is emphasised that action initiatives needs to be undertaken work on local, sub-national and national action to meet the challenges of climate change. Towards this, access to environment friendly technologies, especially in energy, transportation, manufacturing and agriculture are enlisted as priorities[1]. In line with the national objectives, Ministry of Environment and Forests,

[1] http://www.merinews.com/catFull.jsp?articleID=130028

Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for Indian CDM projects.

- *Social well-being.* The CDM project activity should lead to alleviation of poverty by generation of additional employment, removal of social disparities and contribution to provision of basic amenities and leading to improvement in quality of life of people.

- *Economic well-being.* The CDM project activity should bring in additional investment consistent with the needs of the people.

- *Environmental well-being.* This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to proposed activity; bio-diversity friendliness; reduction of levels of pollution in general.

- *Technological well-being.* The CDM project activity would lead to transfer of environmentally safe and sound technologies with a priority to the renewable sector or energy efficiency projects that are comparable to best practices in order to assist in up gradation of technological base.

Each of the above criteria is studied in the context of project activity to ensure that the project activity contributes to the sustainable development and meets the above criteria.

a) In addition to the augmentation of power generation, the proposed project results in alleviation of poverty by creating direct and indirect benefits through employment opportunities for around 220 people during construction and about 20 persons after commissioning of the project. Majority of these employees would be from the neighbouring region of the plant location. The project activity also would contribute for improved economic activities by strengthening of local grid of the state electricity utility. The infrastructure in and around the project area will also improve due to project activity, which otherwise would not have happened in the absence of project. The project provides additional source of income for the local populace by providing employment.

b) Project proponents will mobilise investment to the region to an extent of about Rs. 390.61 millions which otherwise would not have happened in the absence of the project activity. This is a significant investment in the region. The project activity also contributes towards diversification of the state energy supply, which is dominated by conventional fuel based generating units.

c) This project will help the poor and vulnerable sections of the society who are often hit by inadequate power supply, load shedding and poor power quality to receive more reliable supply of power to commercial, residential and agricultural needs.

d) The proposed project activity utilises hydro potential available for power generation, which otherwise is dominated by fossil fuels such as coal, lignite and gas. The project will not result in increase of GHG emissions and cause no negative impact on the environment. The project generates real, measurable and long-term emissions reductions. Further the project activity does not result in degradation of any natural resources, health standards, etc at the project area. Unlike most of the power development projects that require transportation of raw material (coal, gas, biomass etc) as well as by products (fly ash etc) there are no negative local environmental impacts in small hydro power projects as its inputs as renewable on a sustainable basis.

The project will result in utilisation of environmentally safe and sound technologies in small-scale hydroelectric power sector. An overview of project impacts on different parameters of sustainable

development is briefly presented in the following matrix which assesses impacts on -2 to +2 scale (most negative impacts to most positive impacts).

Component Indicators	**Score -2 to +2**
➢ Water quality and quantity (as per technical description of the project, calculated basis)	0
➢ Air quality (reduction of global GHG emissions)	1
➢ Other pollutants (no toxic, radioactive, POPs, or stratospheric ozone layer depleting gases, other than methane are relevant)	0
➢ Soil condition (quality and quantity)	0
➢ Biodiversity (Species and habitat conservation)	0
Sub total	**1**
Social sustainability and development	
➢ Employment (including job quality, fulfilment of labour standards ➢ Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services ➢ Access to energy services ➢ Human and institutional capacity (including empowerment, education, involvement, gender)	+1 +1 +1 0
Sub total	**+3**
Economic and technological development	
➢ Employment (numbers) ➢ Balance of payments (Sustainability) ➢ Technological self reliance (including project explicability, hard currency liability, skills development, institutional capacity, technology transfer)	+1 +1 +2
Sub total	**+4**
TOTAL	**+8**

Thus the above benefits due to the project activity ensure that the project would contribute to the sustainable development of the region.

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 wishes to be considered as project participant (Yes/No)**
India (Host)	**Private Entity:** Jasper Energy Private Limited	No

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

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: Karnataka

A.4.1.3. City/Town/Community etc:

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District: Bijapur
Taluk: Sindgi
Village: Devangaon

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

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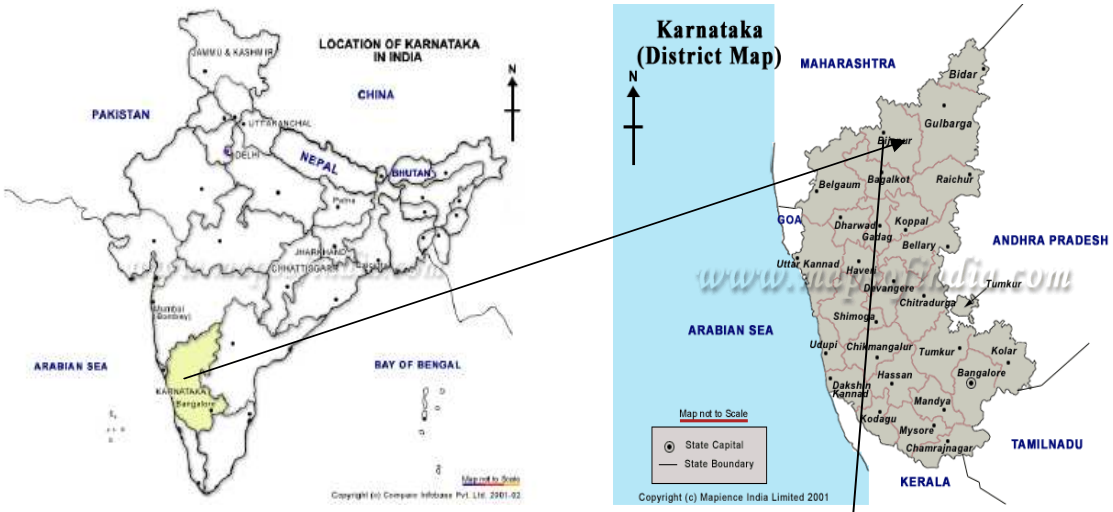
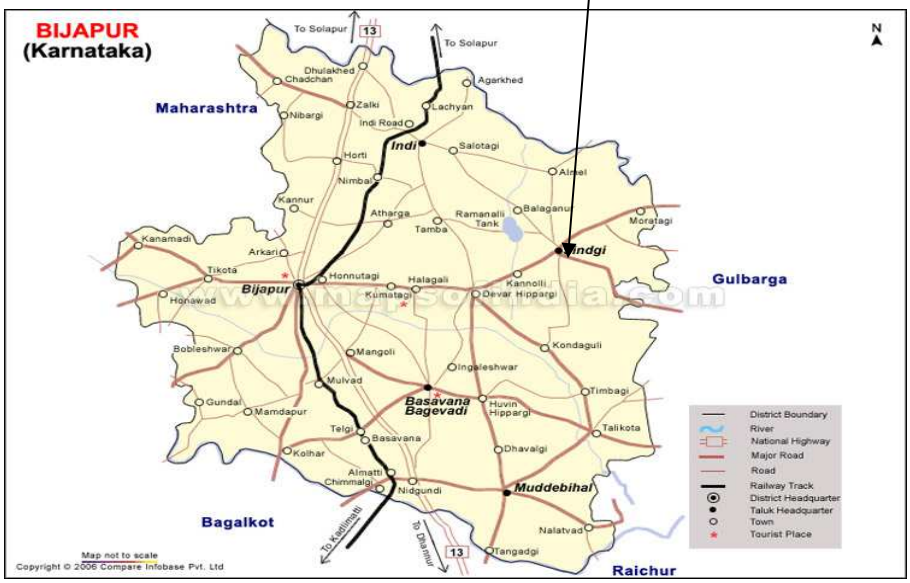
The project site is located in survey no. 523, 526 and 527 of Devangoan village in Sindgi Taluk of Bijapur District in Karnataka. The nearest town is Gulbarga located at a distance of 66 km. The nearest railway station is situated at Gulbarga (66 Km) and the nearest air port is Hyderabad(300kms). The Geographical coordinates of the project location: Longitude:76^0 19' 21"Latitude: 17^0 10' 02".

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



Map 1: Location of Karnataka state in India

Map 1: Location of Bijapur in India



Map3: Location of 10.5 MW Small Hydel Power Project in BijapurDistrict

A.4.2. Type and category(ies) and technology/measure 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 activity falls under the following type and category.

Project Type: Type I – Renewable Energy Projects
Category I.D: Grid connected renewable electricity generation

The project activity utilizes renewable hydro potential for power generation and exports the generated power to the regional grid system. Accordingly, the applicable methodology for the project activity shall be **AMS I.D/ Version 13, EB 36**, which includes hydro electric generation for a grid system.

Application of environmentally sound and safe technology

The technology of power generation process using hydro resources involves converting the kinetic 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 voltage of nearest grid sub-station for proper interconnection and smooth evacuation of power. In this process there are no greenhouse gas emissions or burning of any fossil fuels. Thus electricity is generated through sustainable means without causing any negative effect on the environment. Therefore the technology is environmentally safe and sound.

No technology transfer is envisaged for the CDM project activity.

Technical details of the project activity:

The proposed Sonna mini hydel scheme proposes to utilise discharge of Bhima river through Sonna Barrage under construction on Bhima River. Two Lift Irrigation schemes are proposed on Sonna Barrage. After utilisation of discharge in the Barrage for the two lift irrigation schemes, the remaining flows are to be used for power generation of this Project at Sonna Barrage. The power house of the project will be located on right bank of Bhima river adjoining abutment wall of Sonna barrage near Devangaon village, about 66km from Gulbarga.

The essential components of this power project are a Power House with an installed capacity of 10.5MW near Devangaon village, an Approach Channel, Intake structure, Intake pool with gates and trash rack, a By-Pass weir(Sonna Barrage) with manual gates, Tail Race Pool and Tail Channel. The power house will be just adjoining the intake structure from downstream. The water from the power house will be lead back to the Bhima River through a tail channel of about 371 m length.

The project comprises 3 synchronous generator of capacity 3500 kW each coupled to ‘S’ type horizontal full Kaplan type turbine. The generated voltage at the generator terminals will be 11 kV which will be stepped up to 33 kV by using a 11/33 kV step up transformer. The evacuation of power will be through 33kV double circuit transmission line to KPTCL’s sub station at Afzalpur, which is at a distance of 6 km from the project location.

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Technical Details:

Hydrology
Design Flow : 112.42m^3/sec
Gross Head : 11.47 meters
Design Head : 10.77 meters

Energy
Expected annual generation : 27.64GWh
Auxiliary Consumption : 0.28 GWh
Expected annual export : 27.36 GWh
Generation voltage : 11 kV, 3 phase
Grid transmission voltage : 33 kV

Plant Equipment
Hydro Turbine : Horizontal Full Kaplan type
No. of generating units : Three
Type of Generator : Synchronous generator
Frequency : 50 Hz

Technology transfer

No technology transfer from other countries is involved in the project.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The crediting period chosen for the proposed project activity is 10 years. The total emission reductions are estimated at 233,870 tCO_2 for the total crediting period. The annual emission reductions are estimated at 23,387 tCO_2. Information on the emission reductions are furnished in the table below.

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2009	23,387
2010	23,387
2011	23,387
2012	23,387
2013	23,387
2014	23,387
2015	23,387
2016	23,387
2017	23,387
2018	23,387
Total Emission reductions (tonnes of CO_2e)	**233,870**
Total number of crediting years	**10**

Annual average of the estimated reductions over the crediting period (t CO_2 e)	**23,387**

In the above table the year 2009 corresponds to the period starting from 01.09.2009 to 31.08.2010. Similar interpretation shall apply for remaining years.

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

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

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

In accordance with Appendix C[2] of the Simplified Modalities and Procedures for Small-Scale CDM project activities "DETERMINING THE OCCURANCE OF DEBUNDLING", it can be confirmed that this project activity is not a debundled component of a larger CDM project.

There is no registered CDM project activity or there is no application to register another CDM project activity;

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

SECTION B. Application of a baseline and monitoring methodology

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

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Title: **Type I**, Renewable Energy project,

Reference: **AMS I.D, Grid connected renewable electricity generation, Version 13, EB 36**

B.2 Justification of the choice of the project category:

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The proposed project activity is a 10.5 MW, hydro electric based power project. The project activity is eligible to use the methodology indicated above since project activity generates and exports the renewable electricity to a grid system i.e. dominated by thermal energy sources. The capacity of the project activity is well below the qualifying limit of project activities under the small scale methodology AMS.I.D i.e. 15MW. Hence, AMS.I.D 'Grid connected renewable electricity generation' is applied for the proposed small scale project activity.

The Water and power studies carried out for this project as well as by keeping main parameters in view such as head and discharge available in the river, the project participants declare that the project will be within the limits of the small scale project activity throughout the crediting period. In addition the design

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

parameters of turbine and generator indicate that the project will be within the small scale limit throughout the crediting period.

B.3. Description of the project boundary:

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In accordance with AMS I.D Version. 13 EB 36, the project boundary encompasses the physical, geographical site of the renewable generation source.

The project boundary is therefore the physical boundary around the diversion structure, Intake Channel, Intake Structure, powerhouse, tailrace pool, Tailrace channel and the transmission system the transmission system till the evacuation point and all power plants connected physically to the electricity system that the project activity is connected to the KPTCL grid, which is a part of Southern region grid. The power generated from this project is metered and accurately quantifiable.

B.4. Description of baseline and its development:

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The baseline of the project activity is determined in accordance with the methodology AMS I.D of Appendix B of Simplified modalities and procedures for small scale CDM project activities. According to the methodology, the baseline for the project activity is the amount of electricity displaced or avoided in grid system shall be calculated as the net electricity avoided from the grid (GWh/y) multiplied by an emission factor for the grid system (tCO_2/GWh).

The Emission factor for Southern region is taken from CEA published Grid Emission Factors for Indian grid systems, which are made publicly available on CEA website. The Emission factors are calculated according to the guidelines of CDM UNFCCC website. The key parameters and data sources are furnished below:

Key Parameter	Value	Data Source	Website
EF_y	Baseline emission factor for the southern region grid	CEA published baseline emission factor for southern region grid (CM) CO2 Baseline Database – Version 3.0	www.cea.nic.in
EG_y	Net power export to the grid per annum	From Plant and KPTCL Records. Ex-post determination.	------

The baseline emission factor has been considered from the "**CO2 Baseline Database**" published by CEA. The emission factor published by CEA for the latest year 2006-07 is 854.69 tCO_2/GWh based on combined margin approach.

Actual emission reductions will be calculated ex-post based on the actual amount of electricity exported during each year of the crediting period.

B.5. 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:

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 have undertaken the following analysis in support of additionality.

Barrier Analysis

I. Investment Barrier:

Low return on Investment

IRR is the most commonly used financial indicator by the bankers and investors alike to asses the intrinsic viability of the project. The IRR thus computed, has to be compared with a benchmark indicator.

IRR has been computed for the project on post-tax basis and the same is computed for a period of 20 years. The assumptions considered for financial analysis are based on the detailed project report. In respect of tariff the project proponent has considered the tariff based on the PPA executed with the utility.

The PP has considered weighted average cost of capital as benchmark for the purpose of comparison with IRR. The benchmark is computed considering cost of debt and required rate of return on equity based on Capital Asset Pricing Model. The Benchmark is estimated at 14.70 % and detailed calculations made to estimate the benchmark are furnished to the DOE for verification.

The project IRR in baseline scenario is working out to 12.55%. The IRR is less compared with bench mark of 14.70%. IRR improves to 16.19 % after considering CDM revenue.

The soft copy of investment analysis consisting of assumptions considered while estimating profitability and cash flows, basis for calculation of Weighted Average Cost of Capital as benchmark are provided as annexure to the PDD.

Appropriateness of choosing benchmark:

As per the guidance note issued by CDM EB at its 41st meeting "In case where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average cost of capital (WACC) are appropriate benchmarks for a project IRR" (annex 45, page No.3, item 11 Selection and Validation of Appropriate Benchmarks - EB 41). Based on this the PP has taken into account the Weighted Average Cost of capital as the Benchmark Return. Project IRR is used to demonstrate the Additionality of the project. Since the project is financed by *both* equity and loan, the appropriate benchmark is WACC, since *WACC* represents the weighted average of the costs of various sources of financing in the financing structure. In other words, WACC represents the minimum rate of return, which the project should earn to merit consideration, as failure to earn the minimum rate of return is indicative of unattractiveness of the investment.

- As regards Project IRR, Additionality Tool Ver. 05 states that benchmark/discount rate should be derived from *inter alia* "Estimates of the cost of financing and required return on capital (i.e Government bond rates, increased by a suitable risk premium, where the suitable risk premium is determined based on the capital asset pricing model (CAPM).". Accordingly PP has chosen the required return on capital based on private equity investor required return on comparable projects.,. Based on the model, the expected return on equity has been arrived at 25.34%.

- As per CAPM, the required return on equity investment is the return of a risk-free security plus beta times the difference between the market return and the risk-free return. The weighted average yield of Government Securities (25 years of maturity) has been taken to represent the risk free return[3]. Stock index has been used to represent the market return. With a view to eliminating the unsystematic risks associated with the projects totally, index containing 500 companies [Standard & Poor's CNX500] has been taken to represent the market return. The market return has been arrived at based on the average annual return of the 500 listed securities forming part of Standard & Poor's CNX500 index[4] over a three years period[5] (03.11.2003 to 31.10.2006) prior to the investment decision.

Justification for choosing the Beta value to arrive expected return on equity:

The un-levered Beta Value of the power companies for the one year period ended October 2006 i.e., at the time when the investment decision to go ahead with the project activity are furnished below:

- Jaiprakash Hydro Power : 0.441
- Tata Power Company : 0.550
- NTPC : 0.618
- Reliance Infrastructure : 0.674
- Neyveli Lignite Corporation : 0.737

The Soft copy of the computation for the beta values furnished above along with source for the inputs is furnished separately.

The average un-levered beta value of the above companies is 0.604 is considered as conservative to arrive at expected return on equity for this project activity.

Method for calculation of Beta Value

Beta measures the sensitivity of an investment's returns as compared to a benchmark. This benchmark is commonly the S&P 500 or BSE 500, though any indices can be taken as the benchmark.

[3] http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=7923

[4] http://www.nseindia.com/

[5] A period of 3 years has been taken into account because "About one-fourth of share owners had been holding at least some of their shares for over 10 years and another one fourth for 5 to 10 years. Thus, about one half of our sample shareowners had held some of their shareholding for over 5 years. *About three fourths had shares which had been held for over 3 years"(emphasis added)* - L.C. Gupta, Indian Shareowners- A Survey, Society for Capital Market Research and Development, New Delhi (1991) P. 133

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Calculation Details:

When calculating the beta of an investment the simple monthly returns over the specified comparison period are taken into account. The simple monthly return is:

Return = (End price – Start price) / Start price

Beta is normally calculated for a period of 1 year. Therefore, there will be 12 monthly returns for each the investment and the benchmark. To calculate the beta, these 12 data points are plotted with the benchmark returns along the X axis, and the investment returns along the Y axis. The slope of a best-fit line through these data points is the Beta.

$$\text{Beta} = \frac{\text{Cov.xy}}{\text{Var.x}}$$

Where Cov. stands for covariance, Var. stands for variance, '***x***' are the benchmark returns, and '***y***' are the investment returns.

Method for calculation of unlevered beta

A type of metric that compares the risk of an unlevered company to the risk of the market. The unlevered beta is the beta of a company without any debt. Unlevering a beta removes the financial effects from leverage.

The formula to calculate a company's unlevered beta is:

$$B_U = \frac{B_L}{[1 + (1 - T_C) \times (D/E)]}$$

Where:
B_L is the firm's beta with leverage.
T_c is the corporate tax rate.
D/E is the company's debt/equity ratio.
(Source: http://www.investopedia.com/terms/u/unleveredbeta.asp)

The robustness of the conclusion drawn above has been tested with reasonable variations in the critical assumptions. The Guidance on the Assessment of Investment Analysis issued by the EB in its 39th Meeting covers two aspects on sensitivity analysis, viz., subjecting only those variables which constitute more than 20% of project cost or total project revenue to sensitivity analysis and considering a +/- 10% variations in the selected variables. Accordingly, four sets of scenarios have been identified, viz., variation in project cost, revenue (generation), tariff and salvage value by 10% on either side. Besides analysis is also carried out to indicate at what %age of change in the critical parameters IRR reaches the benchmark return.

Sensitivity analysis has been done for a variation by 10% on either side. The outcome of the sensitivity analysis is given below:

Sensitivity parameters	+10 %	Base Line Scenario%	– 10 %
Project cost	10.83	12.55	14.57
Revenue (generation)	14.30	12.55	10.71
Tariff	14.30	12.55	10.71
Salvage Value	12.56	12.55	12.54

The sensitivity analysis proves beyond doubt that the project is unlikely to be financially attractive even under the most unrealistic optimistic conditions of project cost going down by 10%, revenue going up by 10% or tariff going up by 10% and salvage value is going up by 10%. This proves with no uncertainty that the project activity is not a business-as-usual scenario. It was against this background that the PP, while taking a decision to invest in the project activity, considered the CDM benefits. The minutes of the meeting of the board of directors where the essentiality of the CDM benefits was discussed is furnished to the DOE for verification. CDM benefits go to improve the financial attractiveness of the project activity, as evident from the fact that with CDM benefits, the project IRR in the baseline scenario improves to 16.19% in contrast the benchmark return of 14.70%, thus crossing the benchmark. Hence, the project requires CDM benefits to make it financially attractive.

The project IRR reaches benchmark only if the cost of project is reduced by 10.60% and revenue (generation) goes up by 12.35% and tariff increases by 12.35%. Even if the Realisable value (Salvage value) increases by 100% the IRR does not reaches the benchmark.

All the scenarios are not possible since;

In the project cost civil works and plant and machinery constitute 34% and 51% of the project cost respectively. With the increase in the cost of cement and steel there is no possibility that the cost of project would come down. A CA certificate is furnished to the DOE which indicates that the project cost as envisaged would not come down. Since maximum plausible generation has been considered, generation going beyond what has been assumed is highly unrealistic. Likewise the trend in the past is to reduce the power tariff and hence tariff going up is also highly unrealistic. Even the total project cost is considering the realizable value at end of the terminal year, the IRR will not reach the bench mark, which is not a plausible scenario.

The evidences for the above arguments are furnished below:

Increase in cost of cement and steel:

The cost of cement has gone up by 30%, steel price by 46% between 2003 and 2006 as revealed by the Wholesale Price Index (Cement and Steel) given below[6]:

Year	Cement	Steel
	1993-94 = 100	
2003	146.2	168.3

[6] http://eaindustry.nic.in/asp2/list_d.asp?Fcomm_code=1309030001&Fyear1=2006&Fopt_wmy=Y

http://eaindustry.nic.in/asp2/list_d.asp?Fcomm_code=1310010100&Fyear1=2006&Fopt_wmy=Y

2004	151.1	222.5
2005	162.5	253.5
2006	190.1	246.1

Plant Load Factor:

In computation of IRR, maximum PLF as projected by the DPR has been taken into account. Water flow depends on the rainfall. Bijapur is one of the districts of Karnantaka, which experiences dry spells in cycle. Even if the rain fall is normal, the release of water for power generation is the prerogative of Irrigation Department. Sonna Barrage, on which the project is dependent upon, is for Lift Irrigation and drinking water supply for nearby villages. Whenever the quantity of water upstream of Sonna barrage is low, preference will be given by irrigation department to lift irrigation schemes over generation of power.

The envisaged generation also conforms to the maximum PLF considered by KERC in its tariff order who have considered 30% as maximum PLF for small hydro projects.

Tariff Uncertainty:

The PPA is available only for 10 years and thereafter the same is subjected for review. Any assumption on tariff applicable from 11th year onwards is highly uncertain and do not provide a reliable basis for investment decisions. However it is clear that the tariff from 11th year will be substantially lower for the following reasons.

- By that time there will not be any element of interest as the loans would have been fully paid

Being a small hydro project the PP will have a very weak negotiating position with the state utility who have a strong interest to minimize the tariff. This has been witnessed in the past when the tariff for hydro projects has been reduced from 2.25 per kwh with an escalation of 5% per annum with the base year as 1994-95, then revised to Rs.2.90 per kwh with an escalation of 2% every year. Now the current tariff is Rs.2.80 per kwh with out any escalation. As at the end of the 10 year period the loan would have been paid off, there will not be any charge towards interest and therefore the tariff that will be applicable for the project activity would be less but for the sake of conservative approach the PP has considered the tariff at Rs.2.80 per kWh for the entire period of 20 years.

Salvage Value:

Even if the total project cost is considered as salvage value the IRR working out to 13.17% which is less than the Benchmark of 14.70%.

Uncertainty of project commissioning:

The Sonna Barrage under construction on river Bhima is for lift irrigation purposes and is being implemented by the Government of Karnataka. The barrage is expected to meet the water requirement of people of high areas. The commissioning of the project activity is dependent on the completion of the barrage by the Government. The project is originally scheduled for completion by July 2007. However the project is delayed for various reasons and as per present indications the project is likely to be completed only by July 2009 as per information gathered by the project proponent. Hence the project

operational date is dependent on the completion of Barrage. Hence there is uncertainty on the commencement of generation from this project. The delay in completion of the Barrage may result in increase of implementation period and further increase of project investment and also loss of revenue.

Thus the project justifies the need of CDM funds for the project activity, which will help in improving the project competitiveness and financial sustainability.

III. Early consideration of CDM

The project proponent is a nuclear engineer and by virtue of his professional career he is well aware of the developments in the climate change area, the Kyoto Protocol and the benefits available under the protocol for clean energy projects. One of the reasons for identifying a small hydro project, which is environment friendly and utilises energy available in water flow for power generation has been to generate additional revenue for the project activity through sale of carbon credits available from the project. Therefore, a decision was taken by the board of directors of the company even before the start date of the project activity to consider revenue from CDM to make the project financially attractive. The resolution adopted by the Board would be made available during validation process.

Further the PP has taken several steps for achieving the CDM status. These steps include appointment of a consultant, approaching the DNA for host country approval as well as appointing the validator for project validation. Besides these steps the project proponent was also exploring support for development of the project design document with UNIDO as a Gold standard project in December, 2006 even before the start date of the project activity. He has received a favourable response for funding but as the terms of funding were not favourable the PP could not proceed with the same. Evidence in respect of appointment of consultant, approaching DNA for host country approval as well as other evidences are furnished to the DOE for verification to indicate that CDM was considered Seriously. The chronology of events of the project activity is furnished below:

Detailed Project Report	Sept'2005
Technical Clearance from KREDL	19-Nov-05
Minutes of the meeting considering CDM	2-Nov-06
Appointment of Consultant for CDM documentation	5-Dec-06
Power Purchase Agreement with HESCOM	1-Feb-07
Civil Construction Agreement	12-Feb-07
Loan sanction letter from SBM	17-Mar-07
Order Placement with HPP Energy (For E & M Equipment Supply)	10-Apr-07
Appointment of DOE	23-Nov-07
HCA was issued	26-May-08
Project is expected to be commissioned	July 2009

The registration of the project under CDM would make anthropogenic GHG emission reductions possible to the extent of 23,387 tCO_2 eq per year and will fetch additional annual revenue of about Rs.18.66 millions and this additional revenue will alleviate the said risks to certain extent.

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

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The project activity is generation of electricity using surplus water discharge 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 activity 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 project and the actual generation mix in the grid system.

Baseline Emissions

As the project activity does not modify or retrofit an existing electricity generation facility, the baseline scenario is electricity delivered to the grid by the project that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

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).

$BE_y = EG_y * EF_y$

where,

EG_y = the net electricity exported to the grid system during the year *y*
EF_y = the emission factor of the grid to which the project exports electricity

Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) have worked out baseline emission factors for two grids in India and made them publicly available i.e "**CO_2 Baseline Database**" at

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

The emission factor of the grid for the ex-ante approach is calculated in the following way:

According to the METHODOLOGICAL TOOL, grid emission factor is calculated as Combined Margin (CM), comprising the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor. The following procedure was adopted for estimating the grid electricity emission factor:

Step 1. Identify the relevant electric power system.
Step 2. Select on operating margin (OM) method.
Step 3. Calculate the operating margin emission factor according to the selected method.
Step 4. Identify the cohort of power units to be included in the build margin (BM).
Step 5. Calculate the build margin emission factor.
Step 6. Calculate the combined margin (CM) emission factor.

Step 1 – Identify the relevant electric power system

The CEA of the host country has published a delineation of the project electricity system and connected electricity systems. For identification of relevant electric power system of the project activity the data published by the CEA of the host country is used and the project activity falls under southern regional grid.

Step 2 – Select an operating margin (OM) method

The approved methodological tool recommends the use of one of the following for the calculation of the operating margin emission factor ($EF_{grid,OM,y}$):

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

The methodological tool recommends the use of dispatch data analysis as the first methodological choice. However, in India availability of accurate data on grid system dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour is practically not possible. Also, still the merit order dispatch system has not become applicable and is unlikely to be so during the crediting period.

In view of this it is proposed to apply other choices as suggested in the METHODOLOGICAL TOOL. Since the power supplied by low cost must run power plants[7] to the Southern grid during 2006-07 is clearly below 50%, it has been decided to apply the **Simple OM method.**

The data vintage option selected is the *ex-ante* approach, where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of southern region is considered.

Step 3 – Calculate the operating margin emission factor according to the selected method.

a) Simple OM

In the Simple OM method, the emission factor is calculated as generation weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. Simple OM can be calculated using any of the three available methods. Option A has been selected where the data on fuel consumption and net electricity generation of each power plant/ unit is available. The CEA baseline is derived using the following formulae to calculate simple OM

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}}{\sum_{m} EG_{my}} \quad (1)$$

Where:

$EF_{grid,OM,simple,y}$ is simple operating margin CO2 emission factor in year y (tCO_2/MWh)
$FC_{i,m,y}$ is amount of fossil fuel type *i* consumed by power plant / unit m in year *y* (mass or volume unit)
$NCV_{i,y}$ is net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ /mass or volume unit)

[7] Defined as Hydro, geothermal, wind, low cost biomass, nuclear and solar generation plants in the METHODOLOGICAL TOOL.

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$EFco_{2,I,y}$ is CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$ is net electricity generated and delivered to the grid by power plant / unit m in year *y* (MWh)
m is all power plants / units serving the grid in year *y* except low-cost / must-run power plants / units
i is all fossil fuel types combusted in power plant /unit m in year y
y is either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante)

Table 1: Operating Margin[8]

Most recent three years	2004/05	2005/06	2006/07
Operating Margin* (OM) in t CO_2 / GWh	1000.88	1007.90	1003.03
Average of 3 years	**1003.93**		

* including imports

Source: CDM Carbon Dioxide Baseline Data base, Version 3.0, December 2007 (www.cea.nic.in)

Step 4 – Identify the cohort of power units to be included in the build margin

METHODOLOGICAL TOOL offers two options for determination of build margin emission factor: *ex ante* and *ex post* determination of the Build Margin (BM). Option 1 is selected wherein the build margin emission factor is calculated *ex- ante* based on most recent information available on plants already built for sample group *m* in southern Region. This simplifies the monitoring procedures, but also offers a conservative approach of BM calculation. The sample group *m* shall be the one having higher power generation between (a) five power plants that have been built most recently and (b) the capacity additions in the electricity system that comprises 20% of the system generation built most recently. It is found that the option (b) has higher generation compared to option (a). Hence option (b) is selected.

Step 5 – Calculate the build margin emission factor

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

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

Where:
$EF_{grid,BM,y}$ –Build margin CO_2 emission factor in year y (tCO_2/MWh)

[5]CEA published CO2 data base, http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

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

Build Margin emission factor is determined as below:

Build Margin (BM)	**705.45**	tCO_2 / GWh

Step 6 – Calculation of the baseline emission factor (Combined Margin)

The baseline emission factor in year *y* is calculated as the simple average of the OM and BM emission factors, i.e. OM and BM are each weighted with 50% for the first crediting period. As noted above, the resulting Combined Margin is fixed ex ante for the duration of the crediting period:

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

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

As the proposed project activity is Hydro, the weighting of operating margin emission factor and weighting of build margin emission factor is considered as 0.5 and 0.5 respectively and calculated combined margin as under:

Combined Margin (CM) Simple average of OM and BM	**854.69**	tCO_2 / GWh

Project emissions

No project emissions are applicable to the proposed small scale hydro electric power project, since the electricity generation is based on hydro resources, which does not involve any combustion or generation of emissions from fossil fuels. However, when the project is equipped with diesel generator of suitable capacity to meet the emergency requirements of power house etc., emissions out of usage of fossil fuel (Diesel) will be accounted as project emissions based on the following equation as provided in the approved consolidated methodology.

$$PE_y = PE_{diesel,}$$
$$PE_{diesel,y} = (F_{d,y} \times Density \times NCV_{Diesel} \times EF_{CO2} \times OXID) / 10\text{^}6$$

Where $PE_{diesel,y}$ Project Emissions due to usage of diesel during the year *y* (tCO_2)
$F_{d,y}$ is the quantity of diesel used during the year (Ltrs)

Density of diesel (0.82 kg/Ltr. as per Society of Indian Automobile Mfgs.)
NCV_{Diesel} is the calorific value of diesel (as per IPCC latest default valueTJ/Gg)
EF_{CO2} is the CO_2 emission factor of Diesel (as per IPCC latest default value tCO_2 / TJ)
OXID is the oxidation factor of the Diesel (as per IPCC latest default value)

Leakage:

No leakage emissions are considered for the proposed project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Emission Reductions:

Since the project emissions as well as the leakage 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.

$ER_y = BE_y - PE_y - L_y$

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	EF_y
Data unit:	*t CO_2/GWh*
Description:	CO_2 emission factor for the regional grid system
Source of data used:	CEA published grid emission factors
Value applied:	854.69 (2006-07) Average of 3 years OM and BM
Justification of the choice of data or description of measurement methods and procedures actually applied :	Central Electricity Authority (CEA) values have been used for authenticity of the data, available publicly by Govt of India with a view to obtain uniformity of approach in the country towards a common objective.
Any comment:	--

Data / Parameter:	EF_{CO2}
Data unit:	*tCO_2/TJ*
Description:	CO_2 emission factor of each fuel type
Source of data used:	IPCC default values / India's Initial National Communication to UNFCCC (INC)
Value applied:	Diesel : 74.1 (Source: IPCC)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Indian specific emission factor value is used for data parameter. The emission factor is conservative since it specific to the country and the applied value is high from IPCC emission factor.
Any comment:	--

Data / Parameter:	OXID
Data unit:	*Not applicable (constant)*

Description:	Oxidation Factor of each fuel type
Source of data used:	IPCC 2006 default values
Value applied:	Diesel : 1
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC value have been used for the fuel type since no country specific oxidation factor is available
Any comment:	--

Data / Parameter:	NCV_{Diesel}
Data unit:	*TJ/Gg*
Description:	Net calorific value of diesel
Source of data used:	IPCC default values
Value applied:	43 (Source IPCC 2006)
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC values have been used for diesel since no country specific data is available.
Any comment:	--

Data / Parameter:	$Density_i$
Data unit:	kg/Lit
Description:	Density of the fossil fuel used for the project site (Diesel)
Source of data used:	Society of Indian Automobile Manufacturers (SIAM) *http://www.siamindia.com/scripts/Diesel.aspx*
Value applied:	0.82
Justification of the choice of data or description of measurement methods and procedures actually applied :	The SIAM value is considered as it is publicly available and can be referred as authentic source.
Any comment:	--

B.6.3 Ex-ante calculation of emission reductions:

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Baseline emissions

Baseline emissions calculated as explained in section B.6.1 above are summarised as below.

BE_y = 27.36 GWh × 854.69 tCO_2e/GWh

BE_y = 23,387 tCO_2

Project emissions

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The project emissions due to the combustion of diesel are considered as zero for estimation of ex-ante calculations of emission reductions. The corresponding emissions from the combustion of diesel for operation of DG set if any during emergency situation are considered negligible. However the quantity of diesel combusted in the project activity will be monitored during each year of crediting period (B.7.1) and deducted from baseline emissions, provision has been made in Section B.6.1 by providing formula to calculate project emissions. Since estimation of quantity of diesel consumption is unpredictable before actual operation of the project and also to simplify the calculations of emission reductions, excluding project emissions is considered reasonable.

PE_y = 0 × 0.82×43×74.1×1/10^6 tCO_2 = 0 tCO_2

Leakage

No leakage is applicable.

Emission reductions

ER_y = BE_y - PE_y - L_y

ER_y = 23,387 - 0 - 0

ER_y = 23,387 tCO_2 ($ER_y = BE_y$)

B.6.4 Summary of the ex-ante estimation of emission reductions:

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Summary of the ex ante estimation of emission reductions are furnished below.

Year	Estimation of Project activity Emissions (t CO_2 e)	Estimation of baseline Emissions (t CO_2 e)	Estimation of Leakage (t CO_2 e)	Estimation of overall emission Reductions (t CO_2 e)
2009	0	23,387	0	23,387
2010	0	23,387	0	23,387
2011	0	23,387	0	23,387
2012	0	23,387	0	23,387
2013	0	23,387	0	23,387
2014	0	23,387	0	23,387
2015	0	23,387	0	23,387
2016	0	23,387	0	23,387
2017	0	23,387	0	23,387
2018	0	23,387	0	23,387
Total (tonnes of CO_2e)	**0**	**233,870**	**0**	**233,870**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_{grossy}
Data unit:	GWh
Description:	Total electricity generated by the project during the year *y*
Source of data to be used:	On-site measurements
Value of data	27.64
Description of measurement methods and procedures to be applied:	Measured daily using calibrated meters and aggregated monthly.
QA/QC procedures to be applied:	The meters will be calibrated on annual basis.
Any comment:	--

Data / Parameter:	$EG_{Auxiliaryy}$
Data unit:	GWh
Description:	Auxiliary electricity consumption of the project
Source of data to be used:	On-site measurements
Value of data	0.28
Description of measurement methods and procedures to be applied:	Readings are being recorded from energy meter which was installed in the plant control room or the difference between the gross energy generation and the electricity export to the grid system can be arrived as auxiliary consumption of the project activity.
QA/QC procedures to be applied:	Sales records to the grid and other records are used to ensure consistency. If the data is calculated as the difference between gross and power export, no QA/ QC procedures are applicable, since, the both parameters are already underwent the QA/QC procedures. Meters will be calibrated on annual basis.
Any comment:	--

Data / Parameter:	EG_{y}
Data unit:	GWh
Description:	Electricity supplied to the grid by the project
Source of data to be used:	On-site measurements
Value of data	27.36
Description of measurement methods and procedures to be applied:	Main meters and check meters for measurement of energy are of 0.2 class accuracy. As per the power purchase agreement, the meter readings will be taken jointly by the project proponent and Hubli Electricity Supply Company Limited (HESCOM) on monthly basis.
QA/QC procedures to be applied:	The main meter and check meter will be calibrated on annual basis.
Any comment:	--

Data / Parameter:	$EG_{import,y}$
Data unit:	GWh
Description:	Grid electricity import to the project activity during the year y
Source of data to be used:	On-site measurements

Value of data	0
Description of measurement methods and procedures to be applied:	Main meters and check meters for measurement of energy are of 0.2 class accuracy. As per the power purchase agreement, the meter readings will be taken jointly by the project proponent and Hubli Electricity Supply Company Limited (HESCOM) on monthly basis.
QA/QC procedures to be applied:	The meters will be calibrated on annual basis.
Any comment:	--

Data / Parameter:	$F_{d,y}$
Data unit:	liters
Description:	Quantity of diesel used in DG set during the year, y
Source of data to be used:	On-site measurements/store issues
Value of data	0 (Projected)
Description of measurement methods and procedures to be applied:	The total quantity of HSD consumed will be measured on regular basis using dip stick/ level gauge or store issues. Hence, quantity of HSD consumed is considered for estimation of project emissions. The quantity of diesel consumption during the operation of Diesel Generator set would be recorded in log books maintained at diesel generator room on daily basis. The log book records comprise the period of operation (hrs) and quantity of diesel consumption (liters), whenever the DG set would be operated.
QA/QC procedures to be applied:	The data recorded can be cross checked against the fuel purchase receipts/stocks.
Any comment:	The data on quantity of HSD procured would be collected separately. Data archived: Crediting period + two years. Instruments : Level gauge/dip stick

B.7.2 Description of the monitoring plan:

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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 Karnataka state in India. The monitoring plan, which will be implemented by the project proponent, describes about the monitoring organisation, parameters to be monitored, monitoring practices, QA and QC procedures, data storage and archiving.

Training procedures for the plant operators:

The project proponent intended that the equipment suppliers would impart necessary training to the plant operators as part of equipment supply and installation.

The schedule of training by the equipment supplier is given as below:

(a)	Main level valve	At site
(b)	Turbine	At site
(c)	Governor shop inspection and test	At site

(d)	Generator & Excitation system	At site
(e)	Transformer	At site
(f)	Switchgear	At site
(g)	Computerized control system	At site

The total training period will be decided mutually by the project proponent and the equipment supplier.

Procedures for training of monitoring personnel

The project would employ qualified and experience persons for plant operation. Basic personnel to deal with monitoring of parameters are plant operators. The project would maintain standard log sheets and formats to record the monitoring parameters. The persons would be given proper training to maintain the plant records. The plant manager is the designated person to verify, compile and archive all the monitored data. The parameters to be monitored during the crediting period would be provided in a table format to the designated person. The designated person would be provided training on monitoring procedures and he would be given all necessary formats for monitoring independently. The training would be provided to the monitoring personnel for monitoring the following parameters:

- Gross energy generated
- Auxiliary consumption
- Energy Exported to grid
- Energy Imported from grid
- Periodical Calibration of monitoring equipment.

Further, any uncertainties in monitoring procedure would be assisted by external experts.

Procedures for documentation and storage:

The Plant operators would record the parameters such as Gross Energy generation, Auxiliary consumption, Energy Export to grid and imported from grid every day at 0.0 hrs. The recorded parameters would be documented every day in the standard log books maintained at the plant.

The day to day records would be verified by plant manager, compiled and documented for preparation of internal audit reports.

The company might introduce an internal audit system for documentation and safe storage of data. Internal auditing would be carried out as per the monitoring plan and whenever necessary. An internal audit report would be prepared for review by the Board of Directors. The internal auditor could be an outside entity or one of the senior managers of the plant. The internal auditor would be required to verify the records independently with reference to the power exported and imported. The reports would be submitted periodically to the board of directors.

Internal audit reports are the basic documents for monitoring and storage of plant operational data.

Procedures for Corrective actions

The parameters to be monitored during a crediting period would be compiled as internal audit report for every quarter of each crediting year and submitted to the board of directors for review. The parameters include the Gross generation, Auxiliary consumption; Energy export to grid, imported energy from grid Based on the audit report submitted by plant manager board would asses the performance of plant. Board

would discuss and recommend necessary mechanism to improve the operational efficiency of the plant and direct the respective person to rectify the problem.

The report would also cover comments on variations in the records with reference to the above parameters compared to the bills submitted to the utility or records maintained. The board would consider these variations in their review meeting and instruct the concerned person of the plant to rectify the variations and report the action taken in the next review meeting.

Monitoring Organisation

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the Board of Directors. The Board might delegate the same to a competent person identified for the purpose. The identified person, in the rank of General Manager, would be the in charge of GHG monitoring activities. A team of experienced personnel in various disciplines would assist the General Manager 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 would be the responsibility of the team.

The responsibility of review, storage and archiving of information in good condition lies with the General Manager. General Manager would 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 General Manager would review the data collected by the team and suggest corrective actions wherever required. An internal audit report would be prepared for review by the Board of Directors which would be later submitted for verification by an independent entity (DOE). Board of directors would examine the internal audit reports and would 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.

The team including the General Manager would be appointed by the Boards of Directors of the companies, in advance before the start of project operations. The General Manager would report to the boards of directors and seek guidance in case of conflicts or difficulties in order to maintain the monitoring organisation in good spirit.

Parameters Requiring Monitoring

This monitoring plan requires monitoring of all parameters indicated in section B.7.1 Necessary documents required for verification of the data would be maintained for later archiving. Using the power exported to the grid, emission reductions would be estimated as illustrated in Section B.6.3. Emission reductions generated by the project would be monitored at regular intervals and would be reported to the board of directors.

QA & QC Procedures

The projects would employ latest state-of-the-art microprocessor based high accuracy monitoring and control equipment that would measure, record, report, monitor and control of various key parameters of the plants. These monitoring and controls would be the part of the Control Systems of hydroelectric plant. The maintenance and calibration of the monitoring equipment shall be as per the manual supplied by equipment manufacturers.

The main and check meters will be electronic trivector of accuracy class 0.2% and tested for accuracy every calendar quarter.

The main and check meters will be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2% accuracy class.

If during the quarterly tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter however, will be calibrated immediately.

If the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month upto the date and time of such test will be as per the check meter. The main meter will be calibrated immediately and billing for the period thereafter till the next monthly meter reading will be as per the calibrated main meter.

If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2% accuracy class, all the meters will be re-tested and calibrated immediately.

Records of calibration certificates will be maintained for verification. Hence, high quality is ensured with the above parameters. Sales records will be used and kept for checking the consistency of the recorded data.

Data Storage & Archiving

All the data items monitored under the monitoring plan would be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity whichever occurs later.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

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Date of completion of the baseline: 01/05/2008

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

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:	500028
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.

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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 project activity:

C.1.1. Starting date of the project activity:

>>
12/02/2007 (Civil construction agreement)

C.1.2. Expected operational lifetime of the project activity:

>>
25 years

C.2 Choice of the 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:

The project proponent wishes to select the fixed crediting period.

C.2.2.1. Starting date:

>>
01/09/2009 or from the date of registration whichever is later

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C.2.2.2. Length:

>>

10 years – 0m

SECTION D. Environmental impacts

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

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As per the prevailing regulations of the Host Party i.e. India (represented by the Ministry of Environment and Forests (MoEF), Govt. of India and also the line ministry for environmental issues in India), Environmental Impact Assessment (EIA) studies need not to be done for the projects less than Rs. 1000 millions. Since the total cost of the proposed project is only Rs. 390.61 millions and also comes under the small scale category of CDM projects as per UNFCCC guidelines, it doesn't call for EIA study. However prior to implementation, the project should notify to the Karnataka State Pollution Control Board (KSPCB) for necessary evaluation and approval, which has been done by the proponent and approval, has already been obtained. As required for implementation of the project activity, project participants had studied the possibility of environmental impacts and concluded that no negative impacts are likely due to the project activity. Hence, no documentation or summary is provided here.

There appears to be no significant environmental impact due to implementation of the project activity as no forestland or archaeologically protected monuments are involved. Furthermore, the project involves no displacement of people living near the project area and hence rehabilitation and re-settlement are not called for. All care would be exercised during construction and subsequently so that the existing flora and fauna are not affected adversely.

The project activity is not likely to have any impact on the environment either during construction phase or post project implementation. During the construction as well operation phase it would be ensured that air quality is not effected, noise levels are maintained and there is no effect on water resources, land and ecology.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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No significant environmental impacts is considered due to implementation of project activity by the host party, Hence, no references or procedures specified here.

SECTION E. Stakeholders' comments

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

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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.

The project promoters have conducted stakeholders meeting at the project site at Devangaon Village, Sindigi Taluk, Bijapur District, Karnataka on 02nd April, 2008. The stakeholders are invited through a personal invitations and publicity was given in two newspapers in Kannada (Local Language) and English. The public notice in the news papers for the stakeholders meeting was published on 25th March 2008 to the stakeholders. This prior publicity has given enough time the stakeholders to prepare their comments and made themselves available for the stakeholders meet. The meeting was attended by around 50 stakeholders including village Sarpanch, Committee members and Engineers. There were no comments from the village populace and the grampanchayat members. The copy of the minutes of the stakeholder meeting is furnished to the DOE for verification.

The following stakeholders have been identified for the proposed project activity

Stakeholder Name	***Function of Stakeholder***	***Description of Involvement***
KREDL	Policy implementation body in respect of renewable energy projects in Karnataka. KREDL reviews the project documentation and accords clearance for utilizing renewable energy sources in the state	Issues clearance for setting up the project in Karnataka utilizing hydro potential available at the proposed site.
KPTCL	The state owned electricity utility company that manages the electricity transmission and distribution in Karnataka state. Any electricity generation project proposed in Karnataka shall approach KPTCL for power evacuation arrangements. Both KPTCL and the project proponent shall sign a Power Purchase Agreement, before implementing the project.	Purchase power from the project proponent by executing Power Purchase Agreement to determine the tariff and other terms.
KSPCB	A statutory local body that oversees the pollution control aspects in the state. Any project activity shall obtain clearance from the KSPCB before implementation.	Issues clearance for setting up 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

The process of obtaining stakeholder comments is either through public announcements or directly approaching the stakeholders as required.

CDM – Executive Board

Stakeholders Involvement:

Department of Fisheries
The project got the clearance from DIRECTORS OF Fisheries Govt. of Karnataka **Letter No. Letter No.** RSH/6/2005-06 Dated 15th May 2005.

Department of Industries and Boilers
The project got the clearance from DIRECTORS OF Industries and Boilers Govt. of Karnataka **Letter No. CSMC/MAHC/CR-20/05-06** Dated 3rd JAN 2006.

Department of Irrigation
The project got the clearance for utilising the water resources from Department of Irrigation, Govt. of Karnataka, Letter No. **KNNL/BLIS/Mini Hydel/AE.6/2005-06/2778** dated 10th August 2005.

Pollution Control Board
The Karnataka State Pollution Control Board (KSPCB) has issued 'Consent for Establishment' to the project Letter No.**KSPCB/RO(B)M/ CFE/ LG/HYDEL/2005-06/1278/1279** dated 30th September 2005.

KPTCL
The project has got approval for power evacuation from Karnataka Power Transmission Corporation Limited (KPTCL) vide No. **CEE (P&C)/SEE (PSS)/AEE -9/F-255/CYS-60** dated 8th June 2005.

KREDL
The Karnataka Renewable Energy Development Ltd has issued Technical Clearance Letter No. KREDL/SONNA/2005/2171 Dated.19th Nov.2005.

Local Village Panchayat
The project has got approval from local village panchayat, Letter No. HMGP\MHS\GNP/2004-05 dated 18th April 2005.

Stakeholder's comments:

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

E.2. Summary of the comments received:

>>
No comments have been received.

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

>>
As no comments have been received, hence no report is applicable.

Annex-1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Jasper Energy Private Limited
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URL:	
Represented by:	
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Salutation:	Mr.
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Middle Name:	Thirumala
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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.

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Annex-3

Baseline information

This project uses grid emission factor calculations officially published by the Central Electricity Authority (CEA) of India, following the approaches and rules defined in METHODOLOGICAL TOOL. For details and further information on data please see CEA CO_2 data base from the following web link: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

➔ "CDM Carbon Dioxide Baseline Database, Version 3.0 (December 2007)"

Annex 4

Monitoring information

Monitoring information is already provided in section B.7.2