CDM – Executive Board

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

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>.
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:

>>

Kadamane Mini Hydel Scheme-1 (KMHS-1)
Version 01
13/02/2007

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

>>

Background

Power is a critical infrastructure for economic development and for improving the quality of life. The annual per capita consumption in India is one of the lowest in the world. The inadequate generation capacity in India has resulted in power shortages and threatens to hamper India's economic growth.

Currently, India relies heavily on coal based power plants. Coal contributed to 54.8% of the total electricity generated in the country during the year 2005-06. The large coal reserves in the country provide a ready and economical resource and ensure energy security. To meet the shortage in peak demand, coal fired thermal units are being used. However, the Ministry of Power has identified the poor performance of the existing coal fired thermal power units as the principal cause of power shortages and unreliable quality of power supply which account for over 65% of the total installed capacity. The use of coal fired thermal power units to meet peaking requirements leads to non-optimal utilization of economic and perishable resources.

Another reason identified by the Ministry of Power is the decline in Hydro development. Hence, the Ministry of Non-Conventional Energy Sources (MNES) is encouraging the development of small hydro projects in the State sector as well through private sector participation in many parts of India.

Hydroelectricity is clean energy and its generation is not linked to issues concerning fuel supply, especially the price volatility of imported fuels. It enhances India's energy security and is ideal for meeting the peak demand.

Purpose

Paschim Hydro Energy Private Limited (PHEPL) has set up a 2 x 4.5 MW Small Hydro Power Project plant in Maranhalli Village, Sakaleshpura Taluk, Hassan district, Karnataka. The objective of the power plant is to utilize the natural water and head available at the project site for generation of clean renewable energy.

Project Description

River Yettinahole also known as Kemp Hole is a tributary to river Nethravathy, a West flowing river of Karnataka State, originating at an elevation of about 1000m near Gunjanahallii, about 3.5kms North East of Kadamane Estate near Maranhalli village of Sakaleshpura taluk of Hassan district. The stream flows for 11kms almost south before joining Kemp Hole. This stream has very steep bed slope in its entire reach,

with series of rapids and falls along its course. The stream drops by about 300m, in a stretch of about 2.5kms before it joins the stream near 250th km milestone on Bangalore- Mangalore National Highway (NH-48)

The scheme comprises of construction of 1) a diversion weir straight in plan across the stream Kadamane, ii) gravity type intake, iii) a 1032m long, 2.6m dia horse shoe shaped Head Race Tunnel, iv) 6m dia 21.1m high simple type Surge Shaft, v) 1058m long, 1.00m dia buried steel penstocks, vi) a surface power house with two Horizontal Pelton type generating units of 4.5MW capacity each coupled to Pelton Wheel Turbines vii) Two short 10m long Tail Race Channels. The net annual power generation is expected to be 38.12 Gwhr.

The construction of the project has commenced and is expected to be commissioned by the 1st of April 2007.

Benefits of the project:

The advantages of the project include higher level of reliability, proven technology, high efficiency, lower operating and maintenance cost and ability to easily adjust to load changes. The project also does not result in any production of waste that contributes to global warming, air quality problems or acid rain. The project also results in reduced burden on the non renewable fossil fuels like coal, oil and gas. Hydro projects are also known to have high Energy back ratio (Ratio of total energy produced during a system's normal lifespan, divided by the energy required to build, maintain and fuel it)[1]

Contribution to Sustainable Development

Project activity contributes to the sustainable development in following way:

Socio-Economic well being:

- Karnataka is facing severe shortage of power and is critically affecting the manufacturing and domestic segment. Implementation of Kadamane Mini Hydel Scheme – 1 (KMHS-1) will help in partially meeting this shortage and shall improve the economic activity of the region.
- The project activity would result in the enhanced employment to the local people during the period of construction and after commissioning. It would also help people in the vicinity to develop knowledge related to technical areas of the project.
- Shortage of power in the state is currently being met by importing from other states. KMHS – 1 will be able to provide power at a comparatively lesser cost.
- The project is located in the forest region. There are no habitats in the vicinity of 8 Kms from project site area. The stream is not being used by any habitat. The stream is not being used for any vegetation or for irrigation, either on upstream or downstream of the weir and tail race channel.
- Rural electrification would help in improving the quality of life of the rural people by supplying electricity for lighting of homes, shops, community centres and public places in all villages.
- The project activity will lead to infrastructural development in the region.
- Rural electrification would help in triggering economic development by providing

[1] http://www.hydroquebec.com/sustainable-development/environnement/pdf/rendement_investissement.pdf

electricity as an input for productive uses in agriculture and rural industries.

- The project activity is being implemented in difficult hilly terrain, devoid of basic infrastructure facilities. The project proponent has developed these facilities from scratch for movement of men, machinery and materials.
- The project activity generates employment in the local area. The unit has generated employment opportunities for 200 members of the local population directly during the construction phase and will generate new employment opportunities, both direct and indirect, for operation and maintenance of the plants after commissioning.
- The project has created business opportunities for local stakeholders such as bankers, consultants, suppliers, manufacturers, contractors *etc.*
- The power supplied by the project will be cheaper than that supplied by most of the other Independent Power Producers leading to direct economic benefit for the state government as no fuel is used for power generation. The project activity would thus contribute to the economic well being in the region.
- The company proposes to set up a health care centre in the region which helps in providing timely and quality medical care for the rural population.
- The region in the vicinity of the project is receiving power from Sharavathi project which is located at a distance of 375 Kms and the State Government incurs transmission losses. Setting up of this project in this area will benefit the government and people by reducing the transmission losses by way of supplying the power to the nearby towns from the proposed project.

Environmental well being

- The generation of hydroelectric power will lead to avoidance of the use of conventional sources for power generation. The southern grid is dominated by coal and gas and their avoidance will result in mitigation of greenhouse gas emissions. Additionally, for a hydroelectric power projects do not adversely affect the environment as is the case with the coal and gas based power plants. Hydro electric power being renewable in nature will also assist in conservation of the fast depleting coal and gas reserves.
- There are no rare, threatened, commercial trees and indeterminate plant species available in the project construction area.
- There are no rare, threatened, endangered or migratory fishes present in the Kadamane hole course within the proposed project area.
- As it is a renewable energy project, there would not be any GHG emissions. It leads to conservation of fossil fuel in future.
- Avoidance of the use of conventional fossil fuel would lead to conservation of the fast depleting reserves.
- The project produces absolutely no air pollution/greenhouse gases though Thermal/coal power stations generate emissions. Hydro power generation is very efficient, reliable, and once installed, hydropower systems can be used for both base load and peaking power.
- About 0.03 million ton of CO2 will be emitted from 9MW coal fired thermal power plant. This will reduce 0.03 million tones of green house gas contribution to the global environment every year. The cumulative reduction in Green House gas (CO2) by taking 50 years lifetime of the project thus works out to 1.50 million tones.
- One of the major beneficial impacts of hydropower projects is the treatment of degraded catchments area of the project to control the soil erosion. This results in regeneration of natural forests and other ecosystems significantly benefiting to the environment.

- The project capacity is 9 MW and it would generate 38.12 GWh power annually with a plant load factor of 48% A thermal power plant, equivalent to the capacity of this hydro power project would require 0.04 million tonnes of coal per annum. In other words, this is the saving in fuel consumption due to the country perpetually. With the implementation of this project equal amount of coal is saved. Specific fuel consumption has been taken as 1.06Kg/ Kwh. This will directly benefit to the tune of around Rs.50 Million per year.

In view of the above the project participant considers that the project activity contributes to the sustainable development.

CDM – Executive Board

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Paschim Hydro Energy Private Limited. (Private entity. Project developer.)	No

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

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

>>

The project is located at a distance of about 8.5kms from Maranhalli Village in Sakleshpura Taluka, Hassan District, Karnataka, India.

A.4.1.1. Host Party(ies):

>>

India

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

>>

Karnataka

A.4.1.3. City/Town/Community etc:

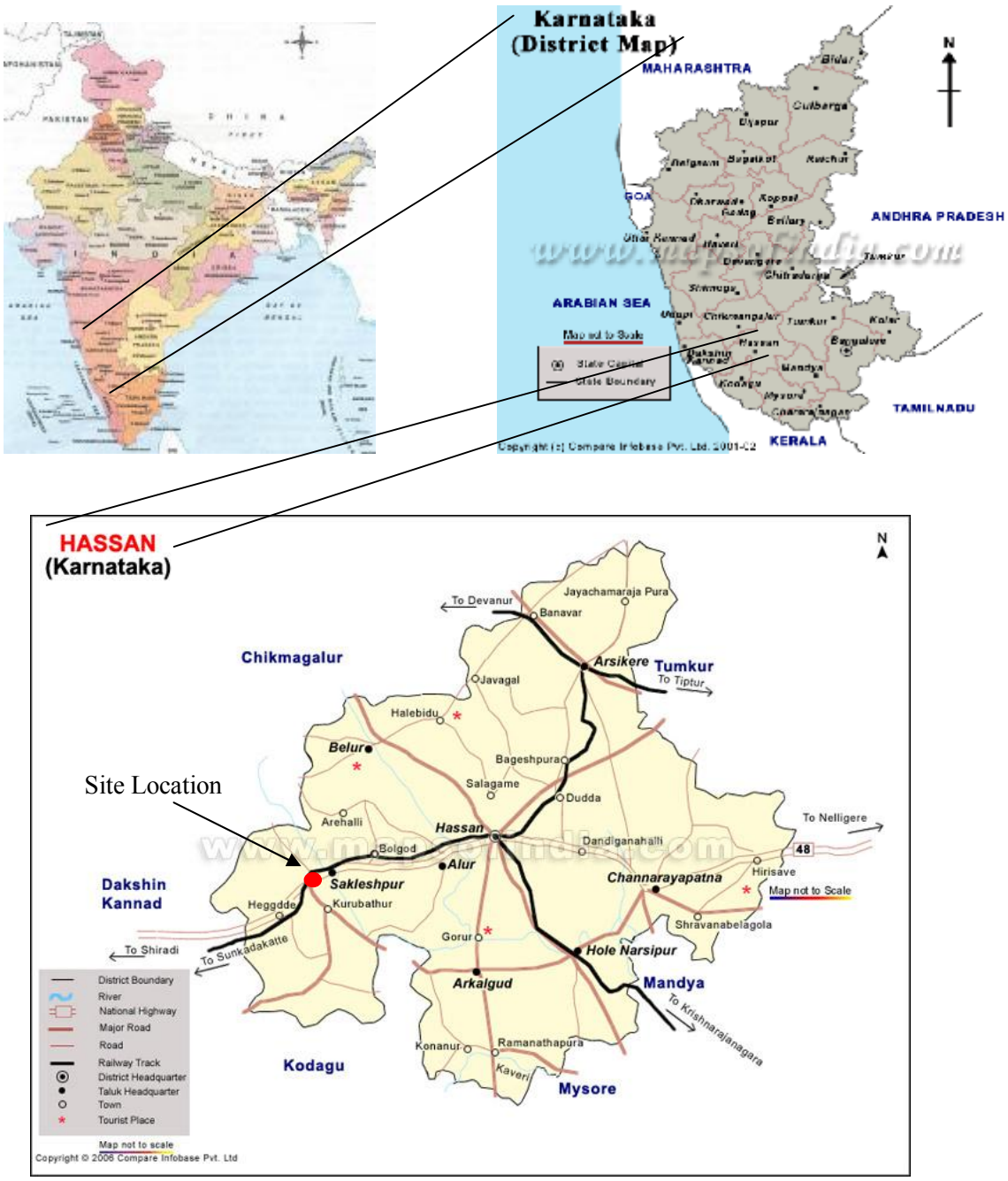
>>

Sakleshpur.

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

>>

The plant is located at a distance of 8.5kms from the village Maranhalli, Sakleshpura Taluka, in the district of Hassan, Karnataka, India. The latitude and longitude of the site are N 13°01 and E 76°10.


Karnataka
(District Map)
MAHARASHTRA
GOA
ANDHRA PRADESH
ARABIAN SEA
KERALA
TAMILNADU
N
HASSAN
(Karnataka)
Site Location
Chikmagalur
Tumkur
Dakshin
Kannad
Kodagu
Mysore
Mandya
Jayachamaraja Pura
To Devanur
Banavar
Arsikere
To Tiptur
Javagal
Halebidu
Belur
Bageshpura
Salagame
Dudda
Arehalli
Hassan
Bolgod
Alur
Sakleshpur
Heggdde
Kurubathur
Dandiganahalli
To Nelligere
48
Hirisave
Channarayapatna
Map not to Scale
Shravanabelagola
Gorur
Hole Narsipur
Arkalgud
To Shiradi
To Sunkadakatte
To Krishnarajanagara
Konanur
Ramanathapura
Kaveri
District Boundary
River
National Highway
Major Road
Road
Railway Track
District Headquarter
Taluk Headquarter
Town
Tourist Place
Map not to scale
Copyright © 2006 Compare Infobase Pvt. Ltd

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

>>

Type: Renewable Energy Project (Small Scale)

Category: Grid Connected Renewable Electricity Generation

Technology/Measure: Hydroelectric renewable energy generation unit supplying electricity to and/or displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

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

>>

Years	Annual estimation of emission reductions in tonnes of CO_2e
2007 – 2008	32454
2008 – 2009	32454
2009 – 2010	32454
2010 – 2011	32454
2011 – 2012	32454
2012 – 2013	32454
2013 – 2014	32454
Total estimated reductions (tones of CO2e)	227178
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	32454

CDM – Executive Board

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

>>

No public funding is available to the project. Project is implemented with equity of project proponent (PHEPL) and long term debt by SBI.

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

According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'Debundling' is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

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

In PHEPL's case, it does not fall under the debundled category and qualifies as a small scale CDM project. It is the single such project of the promoters. The conditions in paragraph 2 of Appendix C confirm that the proposed small-scale project activity is not a debundled component of a larger project activity.

CDM – Executive Board

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:

>>

The small scale methodology applicable to the project activity is

Type I – Renewable Energy Projects,

Subset D - Grid connected renewable electricity generation

Version: 10 (23rd December 2006)

Reference: The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

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

>>

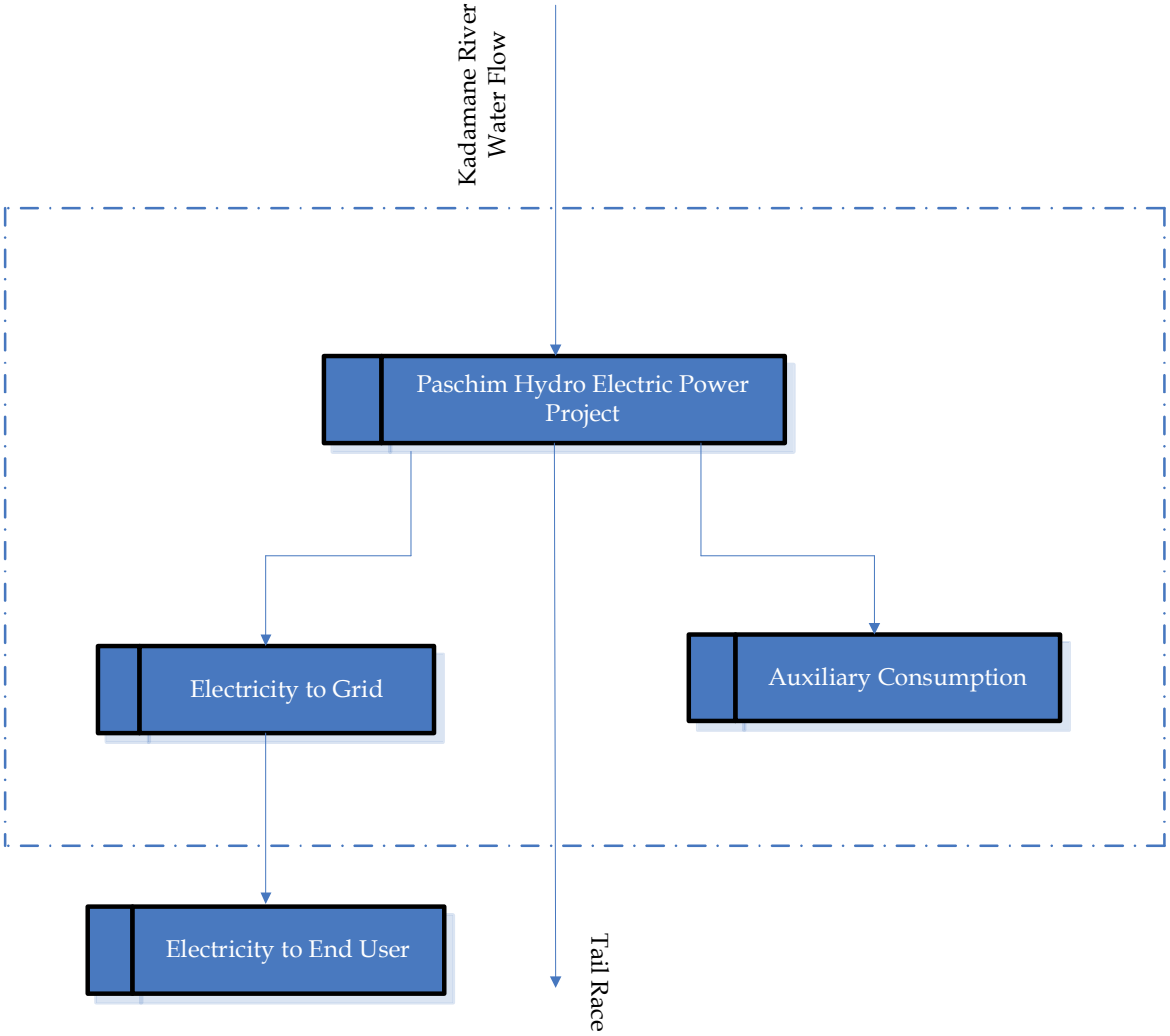
As per Clause 1 of the applied methodology (AMS ID, Version 10, December 23, 2006), the project category comprises of renewable generation units such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

The project activity is a 2 x 4.5 MW Hydel Power project which is less than the specified limit of 15 MW for Small scale Project activities. The project proposes to generate power using hydro electric potential at the proposed site will be exporting it to the Karnataka State Electricity grid. Hence the small scale methodology applicable to the project activity is Type-I Renewable Energy Projects Subset D – Grid Connected renewable electricity generation

B.3. Description of the project boundary:

>>

As per the guidelines mentioned in Type I. D. of Annex B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source. Hence, for the project activity under consideration, the project boundary considered is that encompasses the diversion structure, Head Race Tunnel, penstock, powerhouse, power evacuation system and tailrace channel.



B.4. Description of baseline and its development:

>>

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the the Combined Margin for the Southern grid, the details of which are available on the following website.

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

The procedure for estimation of the baseline factor and the assumptions made has also been detailed in there.

For the purpose of estimation of the Carbon Emission Reductions, the Combined Margin Factor for the Southern Regional grid of 0.86 has been used.

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:

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

As per the decision 17/cp.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Further referring to Appendix A to Annex B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants shall provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s) ;

1) Barriers due to the prevailing practice:

The prevailing practice for power generation in Southern India and in Karnataka can be considered as coal based thermal power generation with dominating share of more than 55% in the total power generation. As on 30th of September 2005, only 44 small hydro electric power projects with a total capacity 252.935 MW had been commissioned in the state of Karnataka out of the total 239 projects sanctioned with a total capacity 1398.8 MW[2]. Thus of the total sanctioned capacity, only over 18% had been commissioned. The total available potential for small hydro electric power for the state of Karnataka is 1500 MW.

This illustrates the low penetration of hydro electric power projects and little willingness of entrepreneurs to change the current operating practices in the region. It can be concluded from the above that the project under discussion is not a common practice in the region. The practice of hydro electric power generation has not penetrated in the region due to certain prohibitive barriers to project implementation. The comprehensive analysis on the common practices adopted for power generation in Karnataka further justifies that the project is not a part of the baseline. The data on the state of hydro electric power projects, suggest that the barriers, which are discussed in this section have hindered the growth of the sector.

Though the hydro electric power projects are not a common practice, the project proponent took up this new initiative of utilizing the existing hydro electric power potential by overcoming the various barriers to prevailing practices and set example for others. The project proponent was well aware of the various barriers to project implementation. However the project proponent was aware that the barriers could be overcome with the availability of carbon financing against a sale consideration of carbon credits that would be generated once the project gets implemented. The project proponent considered CDM revenue stream during the planning stage.

2) Investment Barrier

High Capital Cost

The investments required per MW for hydroelectric power project are much higher when compared to the existing thermal/ gas based power projects. The project involves a total investment of 525 Million INR. So

[2] KREDL Website: http://nitpu3.kar.nic.in/kredl/venture/index.htm

the cost incurred is over 58.33 Million INR per MW which is comparatively higher than those incurred for thermal/gas based power projects.

The power generated at the project site has been proposed to be evacuated to the 66 KV receiving station at Sakleshpur receiving station which is at a distance of 22 Kms from the project site. However, a bottleneck exists in evacuating power to Hassan from Sakleshpur. The vital grid link from Hassan to Sakleshpur is a 66 KV single circuit transmission line with a small conductor equivalent to that of a Rabbit ACSR, which is very old and having lost most of its conducting properties over the years due to heating and corrosion/oxidation in addition to the deteriorated insulators. The capacity to transmit power is likely to be less than 20 MW with out interruption and failure of the line. The consumption at Sakleshpur receiving station is about 1MW to 3 MW. All the pooled up power in excess of 1 to 3 MW will have to flow to the KPTCL grid via Sakleshpur-Hassan 66 KV transmission line, the existing transmission line in this corridor would not sustain and would definitely fail resulting in total loss of generation. Hence a new single circuit on 66 KV double circuit tower transmission line from Sakleshpur to Hassan is being constructed for effective power evacuation. The total cost estimate for Power Evacuation from KMHS-1 mini hydel scheme is expected to be in excess of 45 Million INR.

The project is to be implemented in difficult hilly terrain, devoid of basic infrastructural facilities which need to be created from scratch. A provision of Rs. 10.6 Million had to be made towards formation of approach roads to access Diversion weir sites, surge shaft, and power House site, etc, for transportation of men, materials and equipment which is an additional burden on the project proponent.

The project components are to be constructed in the hilly region, where proper infrastructure is not available. So there is problem for transportation of construction equipments, materials to different project component sites. In order to facilitate the materials and equipments to different sites in the hilly area the project has incurred additional cost.

On account of hilly region, the labour and related costs viz., labour mobilization, retention and cost of providing amenities are very high, as the project area is faraway from residential areas, amenities, and commercial centres.

Long Construction period –

The early onset and extension of the last two monsoon periods, falling within the project construction period have reduced the number of working days and has increased the interest burden on the project, affecting the return on investment, leading to extension of debt repayment periods.

Additional Interest cost

The lenders have increased the interest rates twice after sanction by 100 bps during the project execution period which has impacted the project profitability.

Price fluctuation – The high percentage of civil works (typically 70% by cost) means that it is difficult to accurately predict end – cost, particularly when high exposure to local inflation / price fluctuation is a factor.
The project suffered due to high variation in construction materials prices in short time during project execution period. The cement prices increased more than 61% in a period of 6 months during the early stages of construction which alone contributed to increase in cost by about 10 Million. Steel prices have

increased by about 20%. This increase in prices has put an additional burden on capital cost of the project.

Debt Tenure

The tenure for the debt financing was 11 years which includes project construction period and repayment period of 9 years. However, this tenure is not sufficient for Hydro electric power projects due to the large capital investment required for hydel power projects and the risks associated with the same. The same has been endorsed by the National Electricity Policy of India also[3]. The Power Finance Institutions are offering a repayment period of 12 to 15 years but PHEPL proceeded to execute the project though it was offered repayment period of only 9 years.

3) Other Barriers

a) Hydrological & Geological Risks

Most hydro electric power projects are subject to Hydrological risks and the proposed project is not exception. The project is proposed on a stream with limited water flow and power generation is possible only when there is sufficient water flow. The project proponent has carried out geological and hydrological study at the project site. However, the risk with regards to water availability still pertains.

Flood Risks are inherent to Hydro Power Projects. Further, the proposed project dam is designed for 300 Cumecs flood against 281 Cumecs for 100 year return period and 198 Cumecs for 50 years return period. Though, the project has taken extra care for dam design, still there is flood risk as the project falls in the heavy rainfall zones with rainfall averaging at 6000 mm.

Configurations of Hydro Power Projects are based on rainfall studies and projected water availability for power generation, which is dependent on hydrological studies. Power generation may get adversely affected if the expected rainfall cycle or trends change. The spread of rainfall over a period will help the projects rather than heavy downpour. The revenue of the project is very dependent on the water availability for longer period which is dependent on rainfall pattern, as the proposed project is a run-off-river project.

The terrain in which KMHS - 1 is proposed is located under the lower reaches of the Western Scarps of the Ghats which is prone to landslide hazards. The Ghats have been traditionally prone to landslides. The Hassan District in Karnataka has experienced the largest instrumented earthquake in the history of Karnataka[4]. Almost all the main streams and also the hill ranges nearby have linear disposition over long distances and is attributable to the lineaments in that direction. They are the ancient fault lines contemporaneous with the upliftment of the Ghats. Although these fault lines are no more active because of their ancient age, there is a possibility of the rocks being broken to pieces along these lines due to the intensity of joints. Hence there is a possibility that the tunnel alignment and its excavation along with North South lineament are likely to face over breaks of greater magnitudes.

The ministry of power also acknowledges that with regards to hydro power projects, large variations from estimated costs take place primarily on account of differences between the outcomes of investigation and

[3] http://powermin.nic.in/indian_electricity_scenario/national_electricity_policy.htm

[4] www.undp.org.in/dmweb/events/Final%20Report%20-%20Consultation%20Workshop%20at%20Mangalore.pdf

ground realities both in respect of hydrology and geology[5]. However, the project proponent has decided to proceed ahead with setting up of the project inspite of these inherent risks

4) Policy and Financial Barrier

a) Downward Revision of Tariff Rates

After obtaining the required clearances from various government bodies like the Karnataka State Pollution Control Board, Fisheries department of the Government of Karnataka and the Irrigation department of the Government of Karnataka, the project proponent signed a Power Purchase Agreement with KPTCL in the year 2001. The agreement stated that the project proponent would be given a tariff of Rs.2.25, considering 1994-95 as the base year, with a 5% escalation per annum. Effectively, the project proponent would have received a tariff of Rs.3.85 per unit in the year 2005-06.

However, KPTCL terminated the order and offered the project proponent a new tariff rate of Rs.2.90 for the first year of operation of the plant and 2% escalation for the next nine years. The project proponent was forced to accept the offer and the new PPA was signed on the 5th of November 2004. This represented an erosion of nearly 25% of the revenues.

b) PPA conditions

The PPA signed between PHEPL and KPTCL is subject to the condition that the project would be commissioned by the 25th of April 2007. In case of failure, the PPA would be held null and void and PHEPL would need to sign a new PPA with KPTCL with a tariff of Rs.2.80

Delay in construction of hydel power projects have been identified as an area of concern even by the Ministry of power in promoting hydel power in the country and in encouraging private sector participation. At the time of signing of the PPA, the land lease was yet to be signed by the project proponent and also, the environmental clearance was yet to be granted by the Forest, Ecology and Environment Department. Delays in obtaining the required clearances have affected other hydel power projects in the country and the same has been acknowledged by the Planning commission of India[6]. However, the project proponent decided to take the risk and proceed ahead with the project as it expected the carbon funds to offset any reduction in the expected IRR.

As was apprehended, the project proponent was able to sign the land lease agreement with the Government of Karnataka on the 17th of March 2005 and the Environmental clearance from the Forest, Ecology and Environment Department only on the 20th of April 2005 and 2005 monsoon was set early in the region and the project proponent could hardly undertake any developmental activity till completion of the 2005 monsoon. Hence the start of the construction of the project was delayed by more than 5 months, especially in non monsoon period and when the project was ready to commence activities after the award of contract. Delay in land acquisition and obtaining environmental clearance has adversely affected the financial sustainability of PHEPL.

As on the 31st of December 2006, due to presetting of and due to extended monsoon in the years 2005 & 2006, the project has been delayed by six months. The unanticipated rise in the material cost has resulted in

[5] powermin.gov.in/information_center/pdf/icold.doc

[6] http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/v2_ch8_2.pdf

further budget overruns. In order to meet the set deadline, the project proponent would need to expedite the construction activity which may result in further incurrence of extra cost. The extra cost is likely to be financed through equity as the project proponent may not be able to avail itself of additional loan from the banks. In case the project proponent is not able to raise the required funds and meet the deadline of 25th April 2007, the revised tariff order, passed by KERC on the 18th of January 2005 would be applicable to PHEPL.

The PPA also specified that the project proponent had to achieve financial closure within three months from the date of signing of the PPA. The project proponent had not been able to mobilize debt financing till the signing of the PPA as financial institutions were averse to risking their funds. The short notice of three months provided by KPTCL for financial closure reduced the bargaining power of the project proponent and it had to agree to the interest rates proposed by the State Bank of India.

The project proponent expected an equity IRR of over 24 % during the DPR preparation stage. As a result of the cost escalation, the expected equity IRR has gone down to 14.4%. However, with the receipt of the CDM funds, the equity IRR is expected to increase to 20%.[7]

The above discussion shows that there had been barriers to setting up of the project activity but these had been overcome by the project proponent.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Baseline

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Weighted Average Emission Factor and the Combined Margin for the Southern grid, the details of which are available on the following website.

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

The procedures and formulas used for estimation of the baseline factor and the assumptions made have also been detailed in there.

For the purpose of estimation of CERs, the weighted emission factor of 0.86 has been used.

The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been identified as the mainstay fuel for power generation till 2012[8]. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner and are to be commissioned by the year 2012.

[7] There is uncertainty related to the carbon funds.

[8] http://powermin.nic.in/JSP_SERVLETS/internal.jsp

CDM – Executive Board

From the above discussion, it may be concluded, that in the future, the grid electricity generation using fossil fuel based resources in the Southern grid may increase. Hence, the baseline factor used for CER estimation by the project proponent may be considered conservative.

Project Emissions

The hydro electric project set up by the project proponent is not expected to result in any anthropogenic emissions.

Leakage

PHEPL has identified no anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity. Hence, no leakage is considered from the project activity.

Emission Reduction

$ER = TP_{exp} \times (NEF_B - NEF_p) - EL$

Where

ER	Emission reduction per annum by project activity (tones/year)
TP_{exp}	Total clean power export to grid per annum
NEF_B	Final emission factor of baseline
NEF_p	Net emission factor of project activity
EL	Emission leakage (tonnes/year) (= 0)

The total clean power exported to the grid per annum at the time of verification would be calculated from KPTCL billings.

However for ex-ante calculations of emission reductions TP_{exp} has been calculated as shown below,:

$TP_{exp} = TP_{gen} - TP_{aux} - TP_{loss}$

Where

TP_{gen}	Total power generated
TP_{exp}	Total clean power export to grid per annum
TP_{aux}	Total auxiliary consumption of plant per annum
TP_{loss}	T&D loss

The power generated in the plant will be evacuated to the Sakleshpura substation which is located at a distance of 22 km from the plant. In the absence of the project activity, the deficiency in the region would have been met by fossil fuel based power plants which are located at comparatively much higher distances from the area. However, for the purpose of calculation of CERs, the savings on account of avoidance of T&D losses are not taken into consideration. Hence the transmission & distribution losses have been assumed as zero.

CDM – Executive Board

For the purpose of calculation of ex ante Emission Reductions, the auxiliary consumption has been assumed to be 1% while the Plant Load Factor is 48%.

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

Data / Parameter:	NEF_B
Data unit:	tCO2/KWh
Description:	Baseline Emission Factor
Source of data used:	Central Electricity Authority, Ministry of Power
Value applied:	0.86
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been identified as the mainstay fuel for power generation till 2012. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner and are to be commissioned by the year 2012. Hence, in the coming years, the contribution of fossil fuel based power plants is expected to increase and hence the baseline may be considered conservative.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Based on the methodology and formulas detailed in the above section, the Carbon Emission Reductions have been calculated and are provided in Appendix C

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

>>

	Operating Years	**Baseline Emissions (tonnes of CO_2)**	**Project Emissions (tonnes of CO_2)**	**Emission Reductions (tonnes of CO_2)**
1.	2007-2008	32454	0	32454
2	2008-2009	32454	0	32454
3	2009-2010	32454	0	32454
4	2010-2011	32454	0	32454
5.	2011-2012	32454	0	32454
6.	2012-2013	32454	0	32454
7.	2013-2014	32454	0	32454
	Total	227178	0	227178

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	Power Exported
Data unit:	KWh
Description:	Power exported to the grid by the power plant during the crediting period.
Source of data to be used:	Monthly billing records of Karnataka Power Transmission Corporation Limited for the electricity supplied to the grid.
Value of data	37.74 Million Kwh per annum
Description of measurement methods and procedures to be applied:	Power exported will be recorded at the plant using meters to be installed in the control room of the plant. For billing KPTCL, the meter readings will be taken on 1st of every month by KPTCL officials in presence of company representatives and readings will be jointly certified.
QA/QC procedures to be applied:	The calibration of monitoring equipment will be maintained as per the requirement of KPTCL and the same will be done regularly. Power Generation, will be recorded daily and the same will be verified and approved by Plant Manager. These records will be sent to the Head Office for review by the Director and for corrective actions if necessary. Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system. The Plant will be equipped with energy meters/export meters for monitoring and control purpose. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Karnataka as per terms and conditions of supply. The tests of meters will 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 will not be interfered with, tested or checked except in the presence of representatives of company and KPTCL
Any comment:	The data will be archived for the crediting period plus two years.

Data / Parameter:	Power Imported
Data unit:	KWh
Description:	Power imported from the grid by the power plant for start up purpose during the crediting period.
Source of data to be used:	Monthly billing records of Karnataka Power Transmission Corporation Limtied for the electricity supplied to the grid.
Value of data	0
Description of measurement methods and procedures to be applied:	The power imported from the grid will be measured through meters and the KPTCL will bill the project proponent based on the monthly meter readings.
QA/QC procedures to be applied:	The calibration of monitoring equipment will be maintained as per the requirement of KPTCL and the same will be done regularly. Power Imported, will be recorded

	daily and the same will be verified and approved by Plant Manager. These records will be sent to the Head Office for review by the Director and for corrective actions if necessary. Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system. The Plant will be equipped with energy meters/export meters for monitoring and control purpose. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Karnataka as per terms and conditions of supply. The tests of meters will 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 will not be interfered with, tested or checked except in the presence of representatives of company and KPTCL
Any comment:	The data will be archived for the crediting period plus two years.

Data / Parameter:	Power Generated
Data unit:	KWh
Description:	Power generated by the power plant for start up purpose during the crediting period.
Source of data to be used:	PHEPL Records
Value of data	38.12 Million Kwh Per Annum
Description of measurement methods and procedures to be applied:	The power generated will be measured through meters to be installed at the plant site.
QA/QC procedures to be applied:	The calibration of monitoring equipment will be maintained as per the requirement of KPTCL and the same will be done regularly. Power generated will be recorded daily and the same will be verified and approved by Plant Manager. These records will be sent to the Head Office for review by the Director and for corrective actions if necessary. Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Karnataka as per terms and conditions of supply.
Any comment:	The data will be archived for the crediting period plus two years.

Data / Parameter:	Auxiliary Consumption
Data unit:	KWh

CDM – Executive Board

Description:	Auxiliary Consumption by the power plant during the crediting period.
Source of data to be used:	PHEPL Records
Value of data	0.38 Million Kwh per annum
Description of measurement methods and procedures to be applied:	The auxiliary consumption will be measured using meters to be installed at the plant site.
QA/QC procedures to be applied:	The calibration of monitoring equipment will be maintained as per the requirement of KPTCL and the same will be done regularly. Auxiliary consumption will be recorded daily and the same will be verified and approved by Plant Manager. These records will be sent to the Head Office for review by the Director and for corrective actions if necessary. Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Karnataka as per terms and conditions of supply.
Any comment:	Assumed to be 1% of the total generation.

B.7.2 Description of the monitoring plan:

>>

Monitoring methodologies / guidelines mentioned in the UNFCCC document of "Annex B of the simplified modalities and procedures for small scale CDM project activities" for small scale projects (Type I: D) is considered as basis for monitoring methodology for the activity.

The project proponent will monitor the following using meters to be installed at the plant.

1) Power Generation
2) Auxiliary Consumption
3) Power Exported.
4) Power Imported

Project proponent formed a CDM team/committee comprising of persons from relevant departments, which will be responsible for monitoring of all the parameters mentioned in this section. In the CDM team, a special group of operators is formed who assigned responsibility of monitoring of different parameters and record are keeping. On daily basis, the monitoring reports will be checked and discussed. On monthly basis, these reports will be forwarded at the management level.

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

CDM – Executive Board

>>

13/02/2007

Paschim Hydro Energy Private Limited (Project Proponent).

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:

>>

17/03/2005

The signing of the land lease agreement with the Govt. of Karnataka on 17th March 2005 is considered as the start date for the project which is after the 1st of January 2000.

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

>>

50 Years.

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

The project promoter intends to apply for a **Renewable Crediting Period**

C.2.1. Renewable crediting period

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

>>

01/05/2007

(If the registration of the project is after 01/05/2007, the date of registration would be considered as the start date for the fixed crediting period)

C.2.1.2. Length of the first crediting period:

>>

Initial Crediting period of 7 years, Will be renewed twice for seven years.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

>>

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

>>

The project being hydroelectricity based renewable energy power project with an investment of less than 100 crores, it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification dated June 13, 2002 based on environment protection rule, 1986, public hearing and EIA is required for those industries/projects which are listed in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs.100 crore have been excluded from the list. Hence, it is not required by the host party.

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:

>>

The environmental impacts are not considered to be significant by the project participant or the host party.

SECTION E. Stakeholders' comments

>>

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

>>

The local stakeholders were identified based on the impact or the possibility of impact due to the project activity. The Plant management and the Corporate Headquarter together identified the following as their local stakeholders:

a) Office bearers and residents of the neighbouring villages, c) Representative of KPTCL, Local employees,

The opinion of the institutional stakeholder about the project activity is reflected in the approvals received by RPGPL. However, in order to provide the local villagers, an opportunity to express their view on the project activity and build a rapport with the local population, PHEPL decided to conduct a stakeholder meeting in its plant and invitations were sent in advance intimating them about the day, time, venue and the purpose of the meet.

E.2. Summary of the comments received:

>>

The stakeholder meeting was conducted at PHEPL's proposed plant site and was attended by the office bearer and the residents of the nearby villages, the employees of PHEPL and representative of KPTCL. Summary of the comments received from the stakeholders

Local Population: The villagers and the office bearers their expressed pleasure with the setting up of the power project as it had provided the rural population with permanent employment opportunities. The villagers expected creation of indirect employment opportunity for some of them due to the project activity. Also, they expected the power situation in their village to improve after the commissioning of the plant.

Representative of KPTCL: Stated that the power situation in the region was expected to improve with the setting up of the power project.

Employees: The local population hired by PHEPL are pleased with the employment opportunity and expect that with the commissioning of the plant and with training of the employees, their skills would improve thus providing them with an opportunity to gain higher wages.

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

>>

All comments received were positive. No improvement opportunities were identified.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Paschim Hydro Energy Private Limited
Street/P.O.Box:	8-2-269/S/3A,
Building:	Plot No.3, Sagar Society, Road No.2, Banjara Hills
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 034
Country:	India
Telephone:	91 40, 23350756/856
FAX:	91 40 23357091
E-Mail:	phepl@rediffmail.com
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Movalla
Middle Name:	
First Name:	Srinivas
Department:	Projects
Mobile:	91 984999 6319
Direct FAX:	91 40 23357091
Direct tel:	91 40 23608083
Personal E-Mail:	smovalla@rediffmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NO PUBLIC FUNDING IS AVAILABLE FOR THE PROJECT.

CDM – Executive Board

Annex 3

BASELINE INFORMATION

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the the Combined Margin for the Southern grid, the details of which are available on the following website.

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

The procedures and formulas used for estimation of the baseline factor and the assumptions made has also been detailed in there.

CDM – Executive Board

Annex 4

MONITORING INFORMATION

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

Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system.

The Plant will be equipped with energy meters/export meters for monitoring and control purpose. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Karnataka as per terms and conditions of supply. The tests of meters will 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 will not be interfered with, tested or checked except in the presence of representatives of company and KPTCL. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced. 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 will be immediately replaced and the correction 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 will be as per the replaced meter. Corrections in exported energy will be applicable to the period between the two previous monthly reading and the sate and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption will be recorded at the plant from the installed meters. However, for applying monthly bill to KPTCL the meter readings will be taken on 1st of every month by KPTCL officials in presence of company representatives and readings will be jointly certified.

If both the both and check meters fail to record or if any of the PT fuses are blown out, the export energy will be computed on a mutually agreeable basis for the point of defect.

Power generation, export and auxiliary consumption, fuel consumption will be recorded at the plant daily and the same will be verified by Manager of the plant. These records will be sent to the head office for review by the director and for corrective actions if necessary.

- - - - -

Appendix A
Abbreviations

CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
Cm	Centimeter
CO_2	Carbon Dioxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	India Renewable Energy Development Agency
KREC	Karnataka Regulatory Electricity Commission
Kcal	Kilo Calories
Kg	Kilogram
KM	Kilometer
KP	Kyoto Protocol
KPCB	Karnatak Pollution Control Board
KPTCL	Karnataka Power Transmission Corporation Limited
KW	Kilowatt
KV	Kilovolts
kWh	Kilowatt hour
LP	Low Pressure
MNES	Ministry of Non-Conventional Energy Sources
MT	Metric Tons
MU	Million Units
MW	Megawatt
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PHEPL	Paschim Hydro Energy Private Limited
PLF	Plant Load Factor
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SEB	State Electric Board
SBI	State Bank of India
STG	Steam Turbine Generator

T&D	Transmission and Distribution
TJ	Tera Joule
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B

REFERENCE LIST

Sr. No	References
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) http://cdm.unfccc.int
2.	Website of United Nations Framework Convention on Climate Change, http://unfccc.int
3.	UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol
4.	UNFCCC document: Appendix B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
5.	Detailed project report for KMHS-1 – Paschim Hydro Energy Power Limited
6.	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- http://cea.nic.in
7.	CEA published document "16th Electric Power Survey of India"
8.	Website of KPTCL, www.kptcl.com
9.	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, http://mnes.nic.in
10.	Website of Indian Renewable Energy Development Agency (IREDA), www.ireda.nic.in
11.	www.infraline.com/power/
12.	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. http://envfor.nic.in
13.	Website of KERC, www.kerc.org
14.	KREDL, http://nitpu3.kar.nicin/kredl

- - - - -

Appendix – C

On site Emissions	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Generation capacity , KW	9000	9000	9000	9000	9000	9000	9000
Plant load factor, %	48	48	48	48	48	48	48
No. of hours of plant operation per annum	7920	7920	7920	7920	7920	7920	7920
No. of units generated in a year, millions	38.12	38.12	38.12	38.12	38.12	38.12	38.12
Auxiliary consumption	0.38	0.38	0.38	0.38	0.38	0.38	0.38
No. of units exported to grid, millions	37.74	37.74	37.74	37.74	37.74	37.74	37.74
T&D losses considered on exportable power	0	0	0	0	0	0	0
No. of units replaced in the grid, millions units	37.74	37.74	37.74	37.74	37.74	37.74	37.74
Baseline emission factor considered, $kgCO_2/kWh$	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Baseline emissions, tones	32454	32454	32454	32454	32454	32454	32454
Project emissions, tones	0	0	0	0	0	0	0
Net greenhouse gas emissions, tones	32454	32454	32454	32454	32454	32454	32454
Carbon emission reductions in a year	32454	32454	32454	32454	32454	32454	32454
Total number of CERs	227178						