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

CONTENTS

Revision history of this document

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

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

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

Babanpur, Killa and Sahoke Mini Hydroelectric Projects

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

Purpose

The purpose of the project activity is to generate electricity by utilising water flowing through the existing canal system as a renewable energy resource to meet the ever-increasing demand for energy in the region. The development of the project activity contemplates the production of clean hydroelectric power that will contribute to reduce the CO_2 emissions, which would have occurred otherwise, in the absence of these projects.

Babanpur with total installed capacity of 1.0 MW, Killa 1.75 MW and Sahoke 1.0 MW would generate electricity and sell it to the Punjab State Electricity Board (PSEB) through Power Purchase Agreement (PPA) contract.

These projects are low head, canal drop based mini hydroelectric projects (project activity) located on the Kotla Branch Canal, District Sangrur, Punjab. The projects are run-off-river renewable hydroelectric generating plants, which include forebay, mechanical intake gates, trashracks, draft tubes, vertical turbine and a powerhouse with its discharge channel and adjoining roads. The projects do not involve any type of displacement, rehabilitation or relocation.

Babanpur is located on the fourth fall, Killa on combination of fifth and sixth fall and Sahoke on the combination of seventh and eighth fall on Kotla Branch canal which off-takes from Bharthala head regulator on Patiala feeder-I at Jaura Pul near Malerkotla town. The Patiala feeder-I off-takes from Sirhind canal at Manpur head. Sirhind canal off-takes upstream of Ropar headworks from river Satluj, being fed with releases from Gobind Sagar reservoir of Bhakra dam. The Kotla Branch canal flows through uneven terrain upto district Sirsa, Haryana which necessitates provision of falls along its course.

Punjab being a dominant agricultural and industrial state is facing energy crisis. There are no coalmines or oil wells in Punjab. Geo-thermal and tidal power is also not available in the state. For thermal power, coal has to be transported from distant places. Similarly, the scope for exploiting wind energy is also very limited because of low velocity of winds. The scope for solar energy is very wide in the State. Bio-gas can meet the requirements of rural people to a limited extent. The main source of power in the State all along has been hydroelectric power. Three perennial rivers flow through the State and these along with falls on

the canals are being exploited to generate electricity. To improve the quality/reliability of power supply great importance is being given to strengthen the transmission and distribution system.

As a progressive forward-looking step, Punjab Energy Development Agency (PEDA), a state nodal agency of Government of Punjab is giving close attention to exploiting renewable energy resources. Various irrigation canals in the state flow through uneven terrain, which necessitates provision of falls along the course. If not utilized the power potential available at these canal drops would be wasted. PEDA has identified mini-hydel schemes on such canal falls among the prime sources in this category and has invited private promoters to develop these projects.

M/s Polyplex Corporation Ltd. was entrusted by PEDA to carry out investigations, surveys, preparation of Detailed Project Reports (DPR) leading to construction of these mini hydel schemes. These schemes are being implemented through a special purpose vehicle in the name of Kotla Hydro Power Limited (KHPL).

Contribution of the project activity to sustainable development

Government of India has stipulated social, economic, environmental and technological well-being as indicators for sustainable development in the interim approval guidelines[1] for CDM projects. KHPL believes that the project activity has beneficial effect on agriculture, rural industries and employment in the region and has the potential to shape the economic, environmental and social life of the people in the region.

Environmental well being

- The project activity, by generating clean power would eliminate an equivalent carbon dioxide, sulphur dioxide, nitrogen oxides, SPM *etc.* which would have been otherwise generated to produce electricity.

Social well being

- The project activity has helped to create employment in the area for skilled and unskilled labour during construction and operation.
- The project activity has also helped to create business opportunity for local stakeholders such as bankers, consultants, suppliers / manufacturers, contractors and other small shop owners *etc.*
- The individual schemes are equipped with mechanical trash racks to remove the trash in the canal. This helps to ensure flow of clean water in the canal for irrigation and drinking purposes
- Due to 24 hour operation of the plants, the area has been lighted with road reflectors and flash lights. This has provided security for the local people in the odd hours

Economic well being

---

[1] Ministry of Environment and Forest web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

- This electricity generation from the project activity would substitute the power generation by thermal power plants, which supply electricity to the grid. It would contribute towards the reduction in (demand) use of finite natural resource like coal, natural gas etc. minimizing depletion or else increasing availability to other important processes.
- Project activity would help to reduce transmission losses due to generation of decentralised power close to load points.
- Project activity would help to reduce the demand-supply gap.
- The setting up of these schemes has also helped in the upgradation of old rural grids and strengthening of country's rural electrification coverage..
- Project activity would help in preservation of irrigation canals/bridges/roads by up-gradation of these structures.
- Project activity would also contribute to the state exchequer.

Technological well being

- The technology selected for the power project is using semi Kaplan/vertical full Kaplan type turbines

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	Kotla Hydro Power Limited	No

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

>>

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

>>

A.4.1.1. Host Party(ies):

India

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

Punjab

A.4.1.3. City/Town/Community etc:

District Sangrur

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

Babanpur

The scheme is located on the fourth fall (road distance 26310 m) on Kotla Branch canal which off-takes from Bharthala head regulator on Patiala feeder-I at Jaura Pul near Malerkotla town. Nearest trunk rail head is at Dhuri located about 6 km from the project site whereas the nearest railway station is also at Dhuri on Ludhiana-Sangrur main line. The site is well connected with Malerkotla town with an all-weather road upto Judwa Pul-Bharthala head regulator and by a 4 km long, 22 feet wide partly metal and partly *kuccha* road on left bank of Kotla canal.

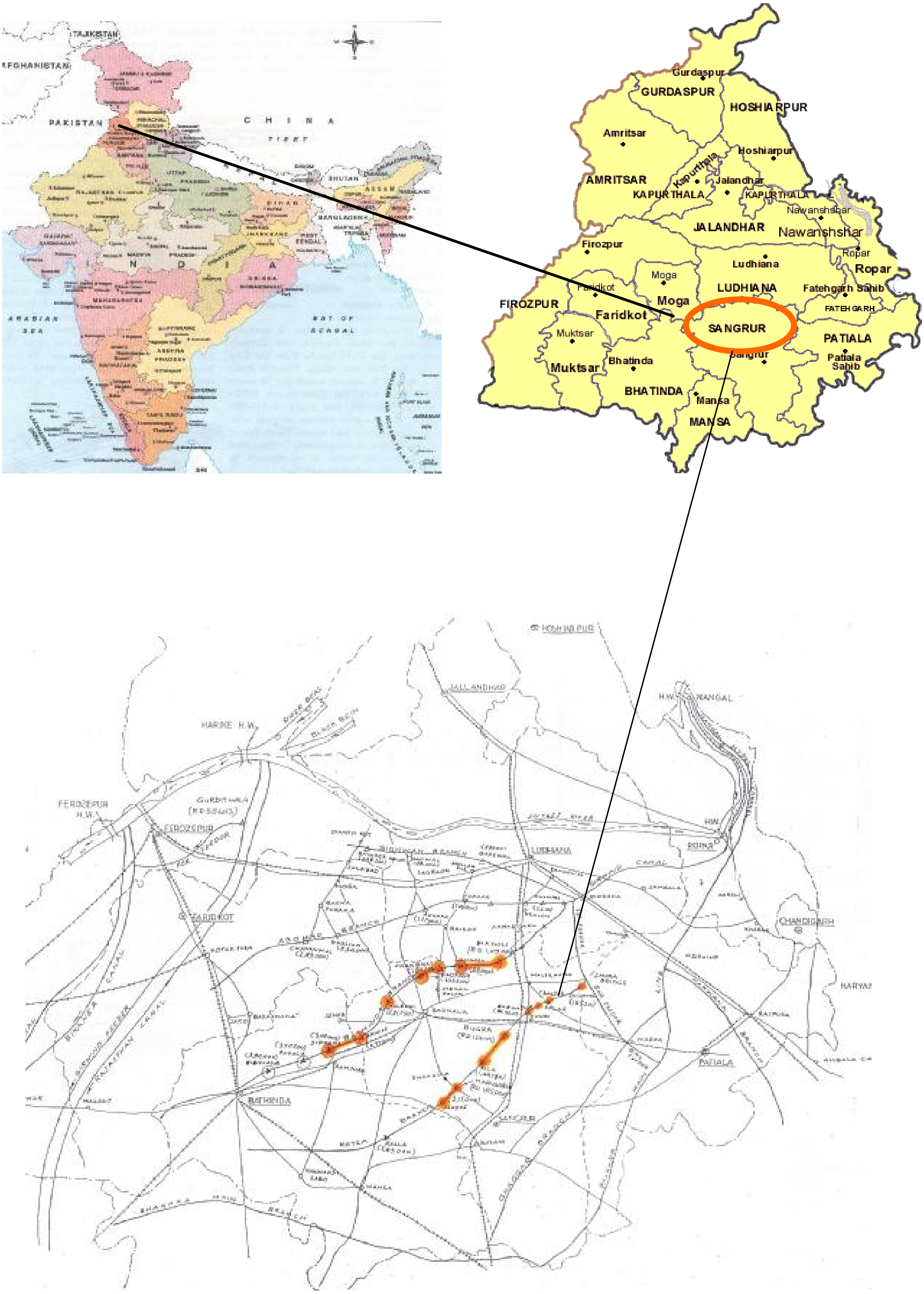
Killa

The scheme is located on the combination of fifth and sixth fall (road distance 44129 m) on Kotla Branch canal which off-takes from Bharthala head regulator on Patiala feeder-I at Jaura Pul near Malerkotla town. Nearest trunk rail head is at Barnala located about 20 km from the project site whereas the nearest railway station is also at Barnala near the Barnala-Sangrur main line. The site is well connected with Barnala town and Judwa Pul-Bharthala head regulator.

Sahoke

The scheme is located on the combination of seventh and eighth fall (road distance 65532 m) on Kotla Branch canal which off-takes from Bharthala head regulator on Patiala feeder-I at Jaura Pul near Malerkotla town. Nearest trunk rail head is at Barnala located about 20 km from the project site whereas the nearest railway station is also at Barnala near the Barnala-Sangrur main line. The site is well connected with Barnala town and Judwa Pul-Bharthala head regulator.

The geographical location of district Sangrur is detailed in the maps below.


PAKISTAN
C H I N A
I N D I A
ARABIAN SEA
BAY OF BENGAL
Gurdaspur
GURDASPUR
HOSHIARPUR
Amritsar
Hoshiarpur
AMRITSAR
Kapurthala
Jalandhar
KAPURTHALA
KAPURTHALA
Nawanshahr
JALANDHAR
Nawanshahr
Firozpur
Ludhiana
Ropar
Ropar
Moga
Faridkot
LUDHIANA
Fatehgarh Sahib
FIROZPUR
Moga
FATEHGARH
Faridkot
SANGRUR
Muktsar
PATIALA
Sangrur
Patiala Sahib
Muktsar
Bhatinda
BHATINDA
Mansa
MANSA
HOSHIARPUR
JALLANDHAR
H.W. NANGAL
HARIKE H.W.
FEROZEPUR H.W.
FEROZEPUR
FARIDKOT
LUDHIANA
CHANDIGARH
PATIALA
BATHINDA
SANGRUR
HARYA

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

Type I: Renewable Energy Project

Category-D: Grid Connected Renewable Electricity Generation

As per the provisions of Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities, (Version 07) Type ID "comprises renewables, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and 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 or non-renewable biomass fired generating unit.

Project activity comprises three renewable mini hydropower schemes with total capacity of 3.75 MW, which supply electricity to the PSEB. With above considerations, the Type I.D. is the most appropriate category for the project under discussion. The project activity does not comprise any electricity generation from non-renewable energy sources.

The baseline and emission reductions calculations from the project would therefore be based on paragraph 7 of Type I.D. The monitoring methodology would be based on the guidance provided in the paragraph 7 of Type I.D.

Technology of project activity

There is no transfer of technology to the host country since the technology is available locally.

Babanpur: The powerhouse comprises of two induction generators of capacity 500 kW each coupled to two numbers of vertical Semi-Kaplan turbines. The power is generated at a voltage of 415V, which is further stepped-up to 11 kV to match the nearest substation voltage level.

Killa: The powerhouse comprises of two synchronous generators of capacity 875 kW each coupled to two numbers of vertical Full-Kaplan turbines. The power is generated at a voltage of 6.6kV, which is further stepped-up to 11 kV to match the nearest substation voltage level.

Sahoke: The powerhouse comprises of one synchronous generator of capacity 1000 kW coupled to a vertical Full-Kaplan turbine. The power is generated at a voltage of 6.6kV, which is further stepped-up to 11 kV to match the nearest substation voltage level.

The principal components of each scheme are:

(a) Forebay and intake- Forebay is partly trapezoidal and RCC trough section where the water is diverted towards the powerhouse upon closure of main canal gates via the intake.

(b) Power house- A semi outdoor type powerhouse has been provided to house the turbines, generators and related electro-mechanical equipment.

(c) Draft tube- RCC draft tube has been provided to convey the tail water emerging from discharge side of the turbine to the main canal via tailrace channel.

(d) Turbine- Vertical semi Kaplan with siphon intake has been provided at Babanpur while vertical full Kaplan has been provided at Killa and Sahoke.

(e) Tailrace- The discharge emerging out of the draft tubes is carried back to main canal on downstream of the project by trapezoidal shaped tailrace channel connecting draft tube exit to the main canal.

(f) Switchyard- Surface type switchyard has been provided with necessary equipment for interfacing with the grid.

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

The project activity, which utilises renewable hydraulic resources, would reduce anthropogenic GHG emissions as per the combined margin carbon intensity of the Northern region grid, which is mainly dominated by fossil fuel based power plants. Since there is no storage of water in the project activity, there are no GHG emissions from the project activity.

Conventional energy equivalent of

- 60.5 million kWh-Babanpur
- 98.05 million kWh-Killa
- 67.26 million kWh-Sahoke

for a period of 10 years would be replaced by power generated from the project activity. The project would thereby result in total CO_2 emission reduction of 212,923 tons over the 10-year crediting period. In the absence of the project activity equivalent electricity would have to be supplied to the Northern region grid customers from a mix of power plants supplying power to grid.

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

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2004-2005	5704
2005-2006	23024
2006-2007	23024
2007-2008	23024
2008-2009	23024
2009-2010	23024
2010-2011	23024
2011-2012	23024
2012-2013	23024
2013-2014	23024
Total estimated reductions (tonnes of CO_2 e)	212,923
Total number of crediting years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	21292

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

Total funding required in the project activity was moblised through debt financing and equity capital. Debt portion, which is around 70% of the total investment, was funded by Indian Renewable Energy Development Agency Ltd. (IREDA) and does not include any public funding from Annex I countries. The equity capital was moblised by the project proponents at their own risk out of their resources. Apart from the above, no other funding is involved.

Hence, the project proponents hereby confirm that public funding from parties included in Annex-I is not involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger 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. The three schemes are being presented as one project activity, with total capacity of 3.75 MW and are not part of any other large project activity.

A 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 small- scale activity at the closest point.

The project activity is not a de-bundled component of a large project activity as the project proponent has not registered or applied to register any other small scale CDM project activity of same project type/category within a project boundary of 1 km.

SECTION B. Application of a baseline methodology:

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

Main Category: Type I - Renewable Energy Projects

Sub Category: I.D. - Grid Connected Renewable Electricity Generation

The reference has been taken from the list of the small-scale CDM project activity categories contained in 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 7'.

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

Appendix B of the simplified M&P for small-scale CDM project activities-Version 7 provides indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. As per this document the project activity falls under Category I.D.-Renewable electricity generation for a grid.

Baseline for projects under Type I. D has been detailed in paragraph 7 of Type I.D. described in Annex B of the simplified modalities and procedures for small-scale CDM project activities It states that the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kgCO2/kWh) calculated in a transparent and conservative manner as:

a) The average of the "approximate operating margin" and the "build margin", where:

   i. The "approximate operating margin" is the weighted average emissions (in kgCO2equ/kWh) of all generating sources surviving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

   ii. The "build margin" is the weighted average emissions (in kgCO2equ/kWh) of recent capacity additions to the system, defined as the higher (in MWh) of most recent 20% of plants built or the 5 most recent plants;

   OR

b) The weighted average emissions (in kgCO2equ/kWh) of current generation mix.

Considering the available guidelines and the present project scenario, Northern region grid has been chosen for baseline analysis by selecting "The average of the approximate operating margin and the build margin (combined margin)" for baseline calculations. The Operating Margin (OM) estimates the effect of the project activity on the operation of existing power plants and the Build Margin (BM) estimates the effect of the proposed project activity on the building of alternate power plants. Elements of operating and build margins are captured in the combined margin which is chosen as representative baseline for the credit period.

In the absence of the project activity, the same energy load would have been taken up by Northern region grid comprised primarily of thermal power plants and emission of CO2 would have occurred due to combustion of conventional fuels like coal / gas. Replacement of grid electricity results in equivalent GHG (CO2) emission reductions related to corresponding reduction in fossil fuel usage in the power plants feeding the grid. If such replacement is brought about by a renewable resource like mini hydro power plants as in the project case, then project emission is zero and the entire emission reductions due to fossil fuel reduction in grid mix gets credited to the project activity.

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

The implementation of the hydro power based project activity is a voluntary step undertaken by KHPL with no direct or indirect mandate by law. The main driving forces to this 'Climate change initiative' have been:

- GHG reduction and subsequent carbon financing against sale consideration of carbon credits.
- Rural Development of the region by creating job opportunities for the local people.
- Demonstration of developing such small hydropower projects on the canal drops to the other entrepreneurs

However, the project proponent was aware of the various barriers associated to project implementation. But it is felt that the availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers.

The barriers faced by the project activity are discussed below:

Prevailing practice barrier:

The prevailing and the common practice in the Indian power sector have been investments in the fossil fuel based power projects. This is mainly due to assured return on investments, economies of scale and easy availability of finances.

The share of energy generated from the small hydropower projects in India's total installed capacity is very small. According to the latest statistics as per Ministry of Non-conventional Energy Sources (MNES), the total installed capacity of small hydropower projects is only at 2181 MW[2] including projects under implementation whereas the India's total installed capacity is around 114,739 MW[3] as on March on 31 March 2005. This translates into a very small share of 1.9% for small hydropower sector.

Further, small/mini hydropower projects have been uncommon in the state of Punjab also. Out of total generation mix of Punjab of 28857 million kWh for year 2002-03 only 9 million kWh was supplied by four mini hydro power plants, which accounts for mere 0.03 % of the generation mix. None of these plants is operated by private parties rather they all are operated by government agency (PSEB). PSEB implemented these projects in late-eighties and has been facing various techno-commercial difficulties such as high down time of equipment, non-availability of grid/discharge, high cost of repair and maintenance resulting in obvious financial losses. This is corroborated by extremely low Plant Load Factor (PLF) figures for these plants over the last six years as given below[4]:

Actual Gross Generation (MUs)	Total	PLFs
1999-00	11.370	33%
2000-01	10.400	30%
2001-02	9.700	28%
2002-03	9.000	26%
2003-04	10.000	29%
2004-05	9.876	29%

Consequently PSEB was reluctant to further take up such projects. In early nineties, PSEB was sanctioned with grant-in-aid from Ministry of Non-conventional Energy Sources (MNES), Govt. of India for setting up four new small hydroelectric projects on Bhatinda branch canal. However, PSEB did not avail the said

[2] Pg. 62; Annual Report 2004-2005; Ministry of Non-Conventional Energy Sources (http://mnes.nic.in/annualreport/2004_2005_English/ch8_pg1.htm)

[3] www.adb.org/Documents/PCRs/IND/pcr-ind-24273.pdf

[4] http://www.pserc.nic.in/ (tariff orders)

grant due to techno-commercial problems faced in earlier projects. The grants were then redirected to PEDA that would lead to private sector participation in these projects.

In April 2003, KHPL decided to go ahead with the implementation of the project activity taking CDM funding into consideration. KHPL was the **third private sector** project proponent (first was Punjab Hydro Power Ltd. and second was Aqua Power Ltd., both of which are trying to avail carbon credits through CDM) to start with implementation of the project activity in the state[5]. This illustrates the low penetration of such renewable energy projects and little willingness of entrepreneurs to change the current operating practices in the region. The practice of generating power from the potential available at these canal drops has not penetrated in the region due to prohibitive barriers to project implementation discussed in this section.

Institutional barriers:

As per the data available till 2001-02, PSEB has been incurring heavy commercial losses since last one decade. The commercial loss (with subsidy) for PSEB (off-taker) in the year 2000-01 was INR 14.76 billion[6]. For their cash in-flows the project proponent depends on the payments from PSEB against the sale of electricity to the grid and it is very likely that there could be problems with the cash inflows of project.

Such a situation had already arisen when PSEB filed a petition with the regulator for revision of terms under already signed PPAs. PSEB had originally signed a PPA with KHPL for purchase of power for a period of 10 years @ INR 3.01 per kWh (base year 2000-01) with a 5 % annual increment upto 2004-05 making it INR 3.66 per kWh now. As per the New and Renewable Sources of Energy (NRSE) Policy-2001 of Government of Punjab PSEB was supposed to purchase power from mini/micro hydro projects in the state @ INR 3.01 per kWh (base year 2000-01) with a 5 % annual increment upto 2004-05. However, in the year 2002 PSEB filed a petition with the Punjab State Electricity Regulatory Commission (PSERC) for revising the tariff to lower rates for purchase of power from these mini hydropower projects. Although the judgment has gone in the favour of developers of these mini hydroelectric projects but likelihood of the PPA being renegotiated at later stage cannot be ruled out in the future due to precarious situation of PSEB. These revisions are bound to severely affect the sustainability of the project activity.

---

[5] Source: Hydroelectric Power Stations in Operation in India, 2003-Central Board of Irrigation and Power

[6] http://www.powermin.nic.in/indian_electricity_scenario/pdf/NR01005.pdf

If this scenario continues, then it would significantly affect the development of other such projects due to reluctance of the financial institutions to support them and would hamper the growth of eco-friendly non-emissive power generation in the state.

In spite of these limitations, KHPL is one such entrepreneur to initiate this GHG abatement project under Clean Development Mechanism. KHPL's success would depend on securing the proposed carbon finance and it would definitely encourage other entrepreneurs to come up with similar project activities contributing further towards GHG emission reduction through the huge untapped small/mini hydro power potential.

In absence of the project proponent's initiative to implement the project, the equivalent electricity would be generated by the Northern region grid mix dominated by fossil fuel based power plants and large hydro power plants.

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

As per the guidelines mentioned in paragraph 4 of Type I.D. described in 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.

The Project Activity i.e. all three projects at Babanpur, Killa and Sahoke is located on various falls at the interval of every 5-6 kilometers downstream on the irrigation canal – Kotla Branch canal. The canal is an offshoot of a large canal network, which is being fed from one of the largest dams of the country i.e. Bhakra Nangal Dam.

The projects are geographically situated in District Sangrur, Punjab.

Areas of Influence:

The project activity has been divided into two areas of influence, which is the Direct area of Influence and the Indirect Area of Influence, briefly described as follows:

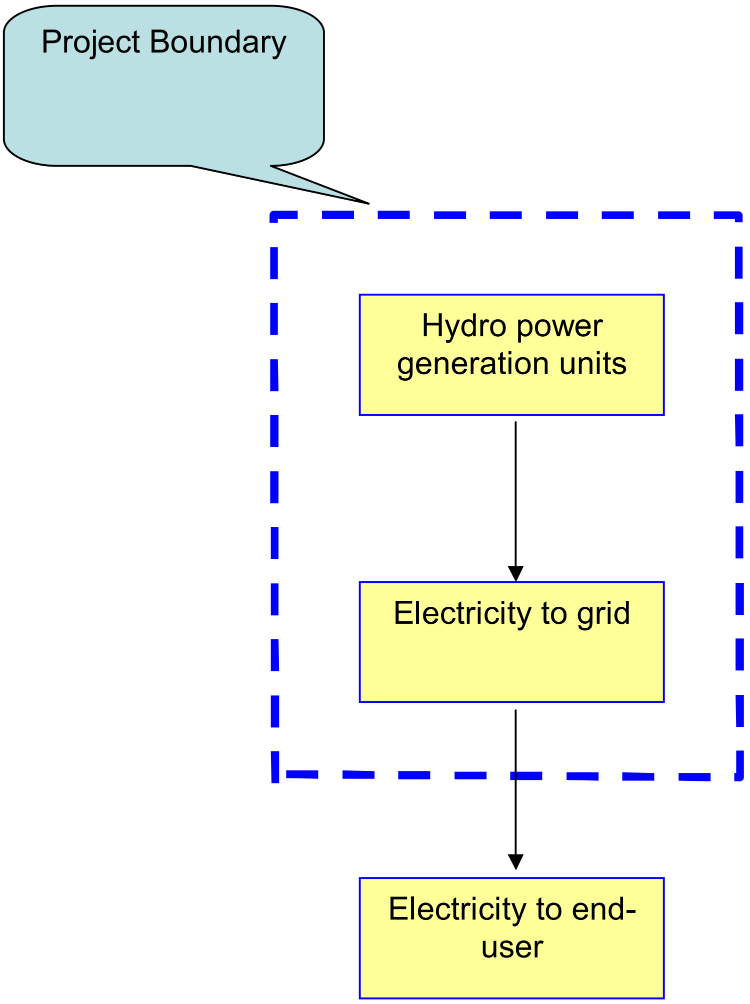
Direct Area of Influence:

The direct area of influence of the project comprises the area where the civil works for the project is done i.e from the forebay to switchyard where the project proponent has a full control. Thus, boundary covers forebay, intake, trash rack, powerhouse, draft tube on downstream of turbine, tailrace, switchyard and all other accessory equipments.

Indirect Area of Influence:

The area of indirect influence comprises of about 1 km stretch of the Kotla branch canal downstream and upstream of the project activity.

For the purpose of calculation of baseline emissions, Northern region grid is included in the system boundary.



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

Using the methodology available in paragraph 7 of Type I.D. described in Annex B of the simplified modalities and procedures for small-scale CDM project activities, **the average of the approximate operating margin and the build margin** (in $kgCO_{2e}qu/kWh$) of current generation mix of Northern region grid is used for the calculation of baseline.

Base line data

Carbon emission factor of grid

Northern region's present generation mix, thermal efficiency, and emission co-efficient are used to arrive at the net carbon intensity/baseline factor of the chosen grid. As per the provisions of the methodology the emission coefficient for the electricity displaced would be calculated in accordance with provisions of paragraph 7 of Type I.D. mentioned in Appendix B of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities for grid systems.

The provisions require the emission coefficient (measured in kg CO_2equ/kWh) to be calculated in a transparent and conservative manner as:

(a) The average of the "approximate operating margin" and the "build margin" (or combined margin)

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

Complete analysis of the electricity generation has been carried out for the calculation of the emission coefficient as per paragraph 7 (a) given above.

Combined Margin

The baseline methodology suggests that the project activity will have an effect on both the operating margin (i.e. the present power generation sources of the grid, weighted according to the actual participation in the grid mix) and the build margin (i.e. weighted average emissions of recent capacity additions) of the selected grid and the baseline emission factor would therefore incorporate an average of both these elements.

Operating Margin

The "approximate operating margin" is defined as the weighted average emissions (in kg CO_2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

The project activity would have some effect on the operating margin of the Northern region grid. The carbon emission factor as per the operating margin takes into consideration the power generation mix of

2004-2005 excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation of the selected grid, and the default value of emission factors of the fuel used for power generation.

Key parameters with their data sources

S No.	Key parameters	Data sources
1.	Generation data for all plants for the year 2004-05 (kWh)	Annual Reports of Northern Region Electricity Board (NREB) (http://www.nreb.nic.in/Reports/ar04-05/chapter2/annx2.7.pdf)
2.	Coal consumption	Annual Performance Review of Thermal Power Plants; CEA (http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-9.pdf)
3.	Calorific value of gas	IPCC
4.	Calorific value of coal	IPCC
5.	Oxidation factors	IPCC
6.	Efficiency of gas based power plants supplying power to grid	Emission Baselines-Estimating the Unknown, page 156: by International Energy Agency (www.iea.org/textbase/nppdf/free/2000/embase2000.pdf)

Emission factors

The emission factors are based on IPCC Guidelines for National Greenhouse Gas Inventories and are given below.

Fuel	Emission factor (tC/TJ)	Emission factor (tCO_2/TJ)
Natural gas	15.3	56.1
Sub-bituminous coal	25.8	94.6

The generation data collected and used is presented further in Table 1.

Average efficiency of gas/combustion turbine (peak load) works out to be 35 % and that for gas turbines in combined cycle works out to be 50 %[7]. On conservative basis average efficiency for base line calculations is considered as 50%. Standard emission factors given in IPCC for coal and gas (thermal generation) are applied over the expected generation mix and net emission factor is determined.

The formulae are presented in Section-E. Carbon Emission Factor of grid as per operating margin is 1.137 kg CO_2/kWh electricity generation.

Build Margin

The "build margin" emission factor is the weighted average emissions (in kg CO_2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants.

The project activity will have some effect on the build margin of the Northern region grid. The baseline factor as per the build margin takes into consideration the delay effect on the future projects and assumes that the past trend will continue in the future. Capacity additions of most recent 20 % of existing plants is greater than (in MWh) than 5 most recent plants hence, for our build margin calculation we would take into consideration 20 % of most recent plants built in Northern region given in Table 2. The key parameters for calculating build margin have been assumed same as that for calculating operating margin. Carbon Emission Factor of grid as per build margin is 0.748 kg CO_2/kWh electricity generation.

Net Carbon Emission Factor Grid for 2004-2005 as per combined margin = (OM + BM)/2 = 0.942 kg of CO_2 / kWh generation.

[7] Emission Baselines-Estimating the Unknown, page 156: by International Energy Agency (www.iea.org/textbase/nppdf/free/2000/embase2000.pdf)

Table 1: Generation and fuel consumption details (2004-05)

Name	Type	Fuel	Generation (million kWh)	Coal Consumption (000' tones)
Badarpur TPS	Thermal	Coal	5462.78	3732
Singrauli STPS	Thermal	Coal	15803.34	10336
Rihand STPS	Thermal	Coal	7988.06	4768
Dadri NCTPS	Thermal	Coal	6842.52	4432
Unchahar-I TPS	Thermal	Coal	3342.83	4604
Unchahar-II TPS	Thermal	Coal	3438.28	-
Tanda TPS	Thermal	Coal	3254.67	2596
Anta GPS	Thermal	Gas	2595.77	-
Auriya GPS	Thermal	Gas	4119.47	-
Dadri GPS	Thermal	Gas	5527.71	-
Faridabad GPS	Thermal	Gas	3172.01	-
Bairasiul	Hydro	Hydel	689.67	-
Salal	Hydro	Hydel	3443.29	-
Tanakpur HPS	Hydro	Hydel	495.17	-
Chamera HPS	Hydro	Hydel	3452.25	-
Uri HPS	Hydro	Hydel	2206.71	-
RAPS-A	Nuclear	Nuclear	1355.20	-
RAPS-B	Nuclear	Nuclear	2954.43	-
NAPS	Nuclear	Nuclear	2760.01	-
Bhakra Complex	Hydro	Hydel	4546.01	-
Dehar	Hydro	Hydel	3150.52	-
Pong	Hydro	Hydel	882.57	-
Delhi	Thermal	Coal	5203.80	-
SJVNL	Hydro	Hydel	1617.45	1330
Delhi	Thermal	Gas	4091.37	-
Haryana	Thermal	Coal	7192.41	5269
Haryana	Hydro	Hydel	251.73	-
H.P.	Hydro	Hydel	3666.39	-
J&K	Hydro	Hydel	851.03	-
J&K	Thermal	Gas	23.51	-
Punjab	Thermal	Coal	14390.42	9520
Punjab	Hydro	Hydel	4420.43	-
Rajasthan	Thermal	Coal	17330.79	11133
Rajasthan	Thermal	Gas	360.70	-
Rajasthan	Hydro	Hydel	494.07	-
U.P.	Thermal	Coal	19788.21	15559
U.P.	Hydro	Hydel	2063.04	-
Uttaranchal	Hydro	Hydel	3452.96	-
TOTAL			**172681.58**	**73279.00**

Table2: Power plants considered for calculating build margin

Plants supplying power to Northern grid are arranged in descending order of date of commissioning
Total generation for 2004-05 = 172681.585
20 % of total generation = 34536.32

	Plant	**Date of commissioning**	**MW**	**Generation in 2004-2005 (Million kWh)[8]**	**Fuel Type**
1.	Chamera HEP-II (Unit 1)	2003-2004	100	1344.07	Hydro
2.	Chamera HEP-II (Unit 2)	2003-2004	100		Hydro
3.	Chamera HEP-II (Unit 3)	2002-2003	100		Hydro
4.	SJVPNL	2003-2004	1500	5108.77	Hydro
5.	Baspa-II (Unit 3)	2003-2004	100	398.94	Hydro
6.	Suratgarh-III (Unit-5)	2003-2004	250	1698.37	Coal
7.	Kota TPS-IV (Unit-6)	2003-2004	195	1302.49	Coal
8.	Baspa-II (Unit 1 & 2)	2002-2003	200	797.88	Hydro
9.	Pragati CCGT (Unit II)	2002-2003	104.6	790.21	Gas
10.	Pragati CCGT (Unit III)	2002-2003	121.2	915.61	Gas
11.	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.5	114.19	Gas
12.	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.8	115.11	Gas
13.	Upper Sindh Extn (HPS)(1)	2001-2002	35	32.12	Hydro
14.	Suratgarh stage-II (3 & 4)	2001-2002	500	3396.74	Coal
15.	Upper Sindh Stage II (2)	2001-2002	35	32.12	Hydro
16.	Malana-1 & 2	2001-2002	86	266.08	Hydro
17.	Panipat TPS Stage 4 (Unit-6)	2000-2001	210	1269.31	Coal
18.	Chenani Stage III (1,2,3)	2000-2001	7.5	19.10	Hydro
19.	Ghanvi HPS (2)	2000-2001	22.5	74.06	Hydro
20.	RAPP (Unit-4)	2000-2001	220	1309.70	Nuclear
21.	Ranjit Sagar (Unit-1,2,3,4)	2000-2001	600	1131.37	Hydro
22.	Gumma HPS	2000-2001	3	4.35	Hydro
23.	Faridabad CCGT (Unit 1) (NTPC)	2000-2001	144	1030.59	Gas
24.	Suratgarh TPS 2	1999-2000	250	1698.37	Coal
25.	RAPS-B (2)	1999-2000	220	1309.70	Nuclear
26.	Uppersindh-2 HPS #1	1999-2000	35	32.12	Hydro
27.	Faridabad GPS 1 & 2 (NTPC)	1999-2000	286	2046.86	Gas
28.	Unchahar-II TPS #2	1999-2000	210	1559.75	Coal
29.	Unchahar-II TPS #1	1998-1999	210	1559.75	Coal
30.	Suratgarh TPS #1	1998-1999	250	1698.37	Coal
31.	GHGTPLM (Unit 1)	1998-1999	210	1453.23	Coal
32.	GHGTPLM (Unit 2)	1997-1998	210	1453.23	Coal
33.	Tanda TPS (Unit-4)	1997-1998	110	731.54	Coal
Total				**34694.10**	
20% of Generation				**34536.32**	

[8] http://www.nrldc.org/docs/grmar2005.pdf

Date of completing the final draft of this baseline section was 06/03/2006.

Kotla Hydro Power Ltd. has determined the baseline and they are project participant as listed in Annex 1 of this document.

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

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

>>

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

26/09/2003

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

30y-0m

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

Project activity would use fixed 10 year crediting period

C.2.1. Renewable crediting period:

>>

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

01/07/2004

C.2.2.2. Length:

10y-0m

SECTION D. Application of a monitoring methodology and plan:

>>

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

Title: Monitoring Methodology for the category I D – Grid Connected Renewable Electricity Generation

Reference: 'Paragraph 9' as provided in Type I.D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

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

As established in Section A.4.2 the project activity falls under Category I.D and can use the monitoring methodology for type I.D project activities.

The methodology requires the project-monitoring plan to consist of metering the electricity generated by the renewable technology. In order to monitor the mitigation of GHG due to the project activity, the total energy exported and imported need to be measured. The net energy supplied to grid (difference of energy exported and imported) by the project activity multiplied by emission factor for Northern region grid, would form the baseline for the project activity.

GHG SOURCES

Direct on-site emissions

There would be no direct on-site emissions after implementation of the project activity since it is a canal drop based mini hydroelectric project without any storage of water.

Direct off-site emissions

Also there would be no direct off-site emissions after implementation of the project activity since it does not involve any transportation of fuel.

Indirect on-site emissions

The indirect on site GHG source is the consumption of energy and the emission of GHGs involved in the construction of project activity.

Considering the life of the project activity and the emissions to be avoided in the life span of 30 years, emissions from the above-mentioned source is too small and hence neglected.

No other indirect on-site emissions are anticipated from the project activity.

Indirect off-site emissions

No indirect off-site emissions are anticipated from the project activity

D.3 Data to be monitored:

a) Parameters affecting the emission reduction potential of the project activity

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Energy	Energy exported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point
2	Energy	Energy imported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point
3	Energy	Net saleable energy	kWh	C	Monthly	Total	Paper	2 years after end of crediting period	This is calculated as difference of 1and 2. It would be based on monthly bills raised by KHPL to PSEB
4	Energy	Energy generated	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at generation end
5	Energy	Auxiliary energy consumption	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at the plant

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

Data	Uncertainty level of data (High Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.
D.3.(a)1	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)2	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)3	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)4	Low	Yes	This data will be used for calculation of emission reductions by project activity in case D.3.(a)1 is not available
D.3.(a)5	Low	Yes	This data will be used for calculation of emission reductions by project activity in case D.3.(a)2 is not available

Key Project Parameters affecting Emission Reductions

Total Power generated by the project: The power exported by KHPL would be monitored to the best accuracy and as per the table given in section D.3.

Auxiliary consumption: The power imported by KHPL would also be monitored to the best accuracy and as per the table given in section D.3. The total quantum of power consumed by the auxiliaries would affect the net power exported to the grid and therefore the amount of GHG reductions. Therefore any increase in the consumption pattern of the auxiliary system would be attended to.

Net Power exported to the grid: The project revenue is based on the net units exported by KHPL.

The general principles for monitoring above parameters are based on:

- Frequency
- Data recording

- Reliability

Frequency

Monthly joint meter reading of main meters installed at interconnection point shall be taken and signed by authorised officials of KHPL and PSEB on any day of the first week of every month as mutual consent. Records of this joint meter reading would be maintained by KHPL.

Data recording

Records of the joint meter reading would be maintained by KHPL. Daily and monthly reports stating the generation, auxiliary consumption, and net power export would be prepared by the shift in-charge and verified by the plant manager

Reliability

For measuring the delivery and import of energy by KHPL one main meter shall be maintained at interconnection point and one check meter shall be maintained at grid substation of PSEB. Main meter reading would form the basis of billing and emission reduction calculations. Main and check Energy meters of 0.5 class having kWh, kVAH and kVARH facility would be used

Monthly joint meter reading of main meters installed at interconnection point shall be taken and signed by authorised officials of KHPL and PSEB on any day of the first week of every month as mutual consent. Records of this joint meter reading would be maintained by KHPL.

KHPL would keep requisite sets of metering equipment, duly tested/calibrated, as spares, for replacement as and when required. Main or Check meter would be replaced by spare set of meter with, mutual consent of the parties when a faulty meter is required to be removed.

The Main and Check meter installed at interconnection point and grid sub-station respectively would be jointly inspected and sealed on behalf of the parties and shall not be interfered with, by either party except in presence of the other party.

The main and check meter would be test checked for accuracy every six months at PSEB's laboratory and sealed by PSEB and KHPL jointly.

If during half yearly test check, main meter is found to be within permissible limits of error and check meter is found to be beyond permissible limits, then billing as well as emission reduction calculation would

be as per main meter as usual. However, the check meter would be calibrated and replaced with spare tested calibrated meter, as may be necessary.

If during half yearly test check, the main meter is found to be beyond permissible limits of error but check meter is found to be within permissible limits, then billing as well as emission reduction calculation for the month and upto date and time of the calibration/replacement of defective main meter shall be as per check meter. The main meter would be immediately calibrated and replaced with spare tested calibrated meter, as may be necessary where after billing as well as emission reduction calculation would be as per main meter.

If during half yearly test checks, the main meter and check meter are both found to be beyond permissible limits of error, then both meters would be immediately replaced with spare calibrated meters and correction would be applied to data recorded by main meter to arrive at correct energy figures for billing as well as emission reduction calculation purposes for period of the month and upto time of calibration/replacement of defective meter. Corrections in billing whenever necessary shall be applicable to the period between date and time of previous test calibration and date and time of test calibration in current month when error is observed and correction would be for full value of absolute error. For the purpose of correction to be applied the meter shall be tested at 100, 75, 50, 25 and 10 % load at 1.0, 0.85 and 0.75 lag power factors. Of these fifteen values, the error at load and power factor nearest the average monthly load served at the point during the period shall be taken as error to be applied for correction

In case main meter at interconnection point becomes defective, the billing and emission reduction calculation would be based on readings of check meter installed at grid sub-station. The defective equipment would be immediately replaced by KHPL.

If both, main and check meters become defective, then emission reduction calculations for the month would be based on hourly generation and auxiliary consumption data recorded by KHPL at generation end.

The meter installed at generation end would be test checked for accuracy every six months. If during half yearly test check, meter is found to be beyond permissible limits, then the meter would be calibrated or replaced with spare tested calibrated meter, as may be necessary.

KHPL shall archive and preserve all the monthly invoices raised against net saleable energy, for at least two years after end of the crediting period. KHPL shall also archive the complete metering data at

generation end on paper and all the data would be preserved for at least two years after end of the crediting period.

All the records pertaining to the site shall be kept at the respective site itself. The data pertaining to the previous years shall be archived separately at the plant office i.e Killa. A copy of the daily generation report shall be sent to the Head Office also.

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

The plant manager would be a qualified diploma/degree engineer with 5-7 year experience in power industry. All the shift incharges would be diploma/degree holders and would undergo related training including plant operations, data monitoring, report generation etc.

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

Kotla Hydro Power Ltd. has determined the monitoring methodology and they are project participant as listed in Annex 1 of this document.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

No formulae for GHG emission reduction is specified for Category I.D of Appendix B of the Simplified Modalities and Procedures for Small-scale CDM Project Activities.

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

>>

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

There would be no GHG emissions of any kind, due to project activity within the project boundary as it is a canal drop based project producing clean energy with no storage of water.

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

As per paragraph 8 of Type I.D. of Appendix B of Simplified Modalities and Procedures for Small-scale CDM Project Activities no leakage calculation is required since the project activity is a renewable energy technology without transfer of equipment from another activity.

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

Emissions due to project activity are zero.

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

Northern region grid has been considered as the baseline. Northern region's present power generation mix has been used to arrive at the net carbon intensity/baseline factor of the chosen grid. As per the provisions of the methodology the emission coefficient for the electricity displaced would be calculated in accordance with provisions of paragraph 7 (a) of Type I.D of '*Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities*'.

The emission coefficient has been calculated in a transparent and conservative manner as: **'the average of the approximate operating margin and the build margin'.**

The step-by-step calculation of base line emission is as follows:

STEP 1. Calculation of Operating Margin emission factor (EF_{OM})

$$EF_{OM} = \sum_{i,j} F_{i,j} \times COEF_{i,j} / \sum_{j} GEN_{j}$$

Where

$COEF_{i,j}$ - is the CO_2 emission coefficient of fuel i (t CO_2 / mass or volume unit of the fuel), calculated as given below and

$GEN_{j,}$ - is the electricity (MWh) delivered to the grid by source j

$F_{i,j}$ - is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j, calculated as given below

j - refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants

The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_{i} = NCV_{i} \times EF_{CO_2,i} \times OXID_{i}$$

Where

NCV_i -is the net calorific value (energy content) per mass or volume unit of a fuel i

$EFCO_{2,i}$ -is the CO_2 emission factor per unit of energy of the fuel i

$OXID_i$ -is the oxidation factor of the fuel

STEP 2. Calculation of the Build Margin emission factor (EF_{BM})

It is calculated as the generation-weighted average emission factor (t CO_2/MWh) of a sample of power plants m of grid, as follows:

$$EF_{BM} = \sum_{i,m} F_{i,m} \times COEF_{i,m} / \sum_{m} GEN_{m}$$

Where

$F_{i,m}$, $COEF_{i,m}$ and GEN_m - are analogous to the variables described for the OM method above for plants m.

Calculations for the Build Margin emission factor EF_{BM} has been done as ex ante based on the most recent information available on plants already built for sample group m of northern grid at the time of PDD submission. The sample group m consists of the 20 % of power plants supplying electricity to grid that have been built most recently, since it comprises of larger annual power generation.

Further, none of the power plant capacity additions in the sample group have been registered as CDM project activities.

STEP 3. Calculation of the electricity baseline emission factor (EF_y)

It is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,}$) and the Build Margin emission factor ($EF_{BM,}$):

$$EF_y = W_{OM} \times EF_{OM} + W_{BM} \times EF_{BM}$$

where the weights W_{OM} and W_{BM}, by default, are 50% (i.e., $W_{OM} = W_{BM} = 0.5$), and $EF_{OM,}$ and EF_{BM} are calculated as described in Steps 1 and 2 above and are expressed in t CO_2/MWh.

$$BE_y = EF_y \times EG_y$$

Where

BE_y - are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y- is the net quantity of electricity generated by the project activity during the year y in MWh, and

EF_y- is the CO_2 baseline emission factor for the electricity displaced due to the project activity in tons CO_2/MWh.

If the same amount of electricity is generated by the Northern region grid mix, it adds to the emissions that are ultimately getting reduced by the project activity. Hence, the baseline calculated using above methods / scenarios would represent the realistic anthropogenic emissions by sources that would occur in absence of the project activity.

The uncertainties in the baseline, arising out of capacity additions trends are already taken into consideration during calculation of combined margin factor.

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

CO_2 emission reduction due to project activity = Baseline emission – Project Activity emission

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

Emission reductions by project activity for 10 year crediting period have been calculated and tabulated as follows:

S No	**Operating Years**	**Emission Reductions, (Tons of CO_2)**		
		Babanpur	**Killa**	**Sahoke**
1.	2004-2005	5704	-	-
2.	2005-2006	5704	10273	7047
3.	2006-2007	5704	10273	7047
4.	2007-2008	5704	10273	7047
5.	2008-2009	5704	10273	7047
6.	2009-2010	5704	10273	7047
7.	2010-2011	5704	10273	7047
8.	2011-2012	5704	10273	7047
9.	2012-2013	5704	10273	7047
10.	2013-2014	5704	10273	7047
Total for each project		**57044**	**92454**	**63424**
Total for three projects		**212,923**		

Therefore an conventional energy equivalent of 225.82 million kWh for a period of 10 years would be saved by exporting power from the project activity which in turn would reduce 212,923 tons of CO_2 emissions considering baseline calculations.

SECTION F.: Environmental impacts:

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

Amendment dated 13 June 2002 to the Environment Impact Assessment (EIA) notification of 27 Jan 1994 of Ministry of Environment and Forest, Govt. of India says that EIA notification does not apply to entry number 19 of Schedule I of the notification if investment is less than INR 100 crore for new project. Since the cost for Babanpur is 6.83 crore, Killa is 11.4 crore and Sahoke is 7.3 core only; none of the projects fall under the purview of the EIA notification. Hence, documentation on analysis of environmental impacts is not required by the host party. However, the 'Consent to Establish' the Babanpur, Killa and Sahoke projects has been obtained from the Punjab Pollution Control Board.

Project Impacts

(a) Impact due to construction

Impact on human settlements, flora and fauna

The effect of project construction on the human floral and faunal aspects were negligible. There is no displacement of any local inhabitants and very small area of private land is required for project. Therefore, no rehabilitation measures were required.

Air and water pollution

The only anticipated air pollution was during the construction phase of project due to dust levels in air. Simple procedures like spraying water to keep dust and SPM levels low were followed during construction.

(b) Impact due to project operation

Land inundation

The project activity is canal drop based scheme, therefore it does not involve any storage reservoir. Thus, project operation would not lead to any inundation of surrounding area.

SECTION G. Stakeholders' comments:

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

KHPL organised stakeholder consultation meetings at individual sites with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. Invitation for stakeholder consultation meetings were sent out requesting the stakeholders to participate and communicate any suggestions/objections regarding the project activity in writing. On the day of meeting, KHPL representatives presented the salient features of the company and the project activity to the stakeholders and requested their suggestions/objections. The opinions expressed by the stakeholders were recorded and are available on request.

Invitations were sent out to:

- Village Head (Sarpanch) and other members (Panchs) of village Panchayat (judicial body at village level) of adjoining villages.
- Secretary, village development committee
- Members of Sports Club
- Farmers from the adjoining villages.

The other stakeholders identified for the project activity are as under:

- State Government of Punjab
- Punjab State Electricity Regulatory Commission
- Punjab State Electricity Board
- Punjab Energy Development Agency
- Punjab Irrigation Department
- Ministry of Commerce & Industry
- Ministry of Environment and Forest
- Indian Renewable Energy Development Agency - Lenders

Stakeholders list includes the government parties, which are involved in the project activity at various stages. At the appropriate stage of the project development, stakeholders were involved to get the clearances.

G.2. Summary of the comments received:

As a result of the meetings with stakeholders and local population comprising of the local people in and around the project area, the following comments were received.

1. By generating clean power, the projects would provide energy to an energy deficit state and contribute in the economic development of the state and the nation.
2. The project activity provides good direct & indirect employment opportunities to the local populace.
3. There is no problem or any kind of trouble due to the project activity.
4. The project does not require displacement of any local population. Thus, the project will not cause any adverse social impacts on local population. Rather, it will help in improvising their quality of life.

As a buyer of the power, the PSEB is a major stakeholder in the project. They hold the key to the commercial success of the project. KHPL has already signed Power Purchase Agreements (PPA) with PSEB for a period of 30 years. The power tariff and various other terms and conditions have been approved by the Punjab State Electricity Regulatory Commission.

The Governor of Punjab, through Chief Executive, Punjab Energy Development Agency (PEDA), under the Department of Science, Technology and Environment and Non-conventional Energy Sources of Govt. of Punjab has accorded the permission for setting up all the three projects through Implementation Agreements.

Ministry of Environment and Forest has diverted the forest land in favour of KHPL for implementation of all the three schemes.

Indian Renewable Energy Development Agency (IREDA) has sanctioned the loans for all the three projects.

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

No major concern was raised during the stakeholder consultation meeting and satisfactory answers were provided to the issues raised by them.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Kotla Hydro Power Limited
Street/P.O.Box:	B-37, Sector-1, Noida – 201 301
Building:	--
City:	Gautam Budh Nagar
State/Region:	Uttar Pradesh
Postcode/ZIP:	201301
Country:	India
Telephone:	91 120 2443716-19
FAX:	91 120 2443723/24
E-Mail:	phpl@polyplex.com
URL:	--
Represented by:	
Title:	-
Salutation:	Mr.
Last Name:	Jindal
Middle Name:	Kumar
First Name:	Rajesh
Department:	--
Mobile:	91 9810092024
Direct FAX:	--
Direct tel:	91 120 2443720
Personal E-Mail:	rjindal@polyplex.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Total funding required in the project activity was moblised through debt financing and equity capital. Debt portion, which is around 70% of the total investment, was funded by Indian Renewable Energy Development Agency Ltd. (IREDA) and does not include any public funding from Annex I countries. The equity capital was moblised by the project proponents at their own risk out of their resources. Apart from the above, no other funding is involved.

Hence, the project proponents hereby confirm that public funding from parties included in Annex-I is not involved in the project activity.

ABBREVIATIONS

BM	Build Margin
CEA	Central Electricity Authority
CO_2	Carbon dioxide
DPR	Detailed Project Report
EIA	Environment Impact Assessment
GHG	Greenhouse gas
IPCC	Inter Governmental Panel On Climate Change
IREDA	Indian Renewable Energy Development Agency
Kg	Kilogram
KHPL	Kotla Hydro Power Limited
Km	Kilometer
kW	Kilo watt
kWh	Kilo watt hour
MW	Mega watt
OM	Operating Margin
PDD	Project design document
PEDA	Punjab Energy Development Agency
PPA	Power Purchase Agreement
PSEB	Punjab State Electricity Board
RCC	Reinforced Cement Concrete
SHR	Station Heat Rate
UNFCCC	United Nations Framework Convention on Climate Change

List of References

Sl. No.	Particulars of the references
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change
2.	Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
3.	UNFCCC document: Clean Development Mechanism, Simplified Project Design Document For Small Scale Project Activities (SSC-PDD), Version 2
4.	UNFCCC document: Simplified modalities and procedures for small–scale clean development mechanism project activities
5.	UNFCCC document: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, Version 07
6.	UNFCCC document: Determining the occurrence of debundling
7.	Statistics of Punjab State Electricity Board
8.	Power sector profile for Northern region as on 30.11.04-Ministry of Power
9.	Website of Ministry of Power (MoP), Govt. of India www.powermin.nic.in
10.	Punjab State Electricity Regulatory Commission (PSERC)-tariff order for PSEB-FY2003-04
11.	Central Electricity Authority (CEA), Govt. of India www.cea.nic.in