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:

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Title - 3MW Neora Small Hydro Power Project at Darjeeling in West Bengal, India.

Version – 01

Date – 30th January 2007

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

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The project activity involves setting up of a 3 megawatt (MW) run-of-the-river small[1] hydro power project to export clean power to West Bengal State Electricity Board (WBSEB) grid (part of Eastern Regional grid[2]) of India. Under the project activity, a drop type diversion weir is constructed upstream of the river Neora in Darjeeling district, West Bengal. The diverted water is led through the de-silting chamber, forebay and finally dropped through a penstock to drive 3 x 1 MW turbo-generating sets to generate power at 3.3 kilo Volt (kV). Power thus generated is stepped-up to 11kV for exporting to the nearest West Bengal State Electricity Board (WBSEB) substation at Chalsa, Darjeeling. Around 12.2 million kilo watt-hour (MkWh) of power is fed to the grid annually under the project activity.

The project proponent, Neora Hydro Limited (NHL) is a subsidiary of Texmaco Limited, which comes under the KK Birla Group of Companies. Apart from being the largest manufacturer of railway wagons in India, Texmaco is also involved in the production of penstocks, gates and allied structures of hydro power.

Purpose:

The objective of the project activity is to harness renewable energy in the form of hydro potential for supplying power to grid. The northern part of the state of West Bengal has abundant snow and monsoon fed rivers with immense hydro power potential yet to be utilised. The project proponent is the first private

[1] As per the Ministry of Non Conventional Energy Sources (under Government of India) guidelines, hydro projects with station capacity from 2MW up to 25MW are classified as Small hydro projects (Refer: http://mnes.nic.in/akshayurja/akshyaurja_2005_09_10_english.pdf)

[2] From the view point of electricity generation, India is demarcated into five regions viz. Northern Region, Western Region, Southern Region, Eastern Region and North-Eastern Region. Eastern Region comprising of states of

enterprise in West Bengal to take advantage of this potential. Further, the project envisages no adverse effect on the ecological characteristics of the area.

The project activity thus aids in displacing an equivalent amount of power from fossil fuel based thermal power plants feeding to the grid leading to reduction in greenhouse gas (GHG) emissions.

The project contributes to sustainable development of India in the following ways:

Social well-being: No human displacement is involved in the project activity and hence no problem of resettlement is envisaged. The project contributes towards stability of grid power which is a major concern in the hilly areas surrounding the project activity. It also provides additional employment during construction and operational phases of the project activity which leads to alleviation of poverty in the area. The project proponent is also developing approach road, communication facilities, housing and other infrastructure for the project activity leading to an overall infrastructure development in the remote area. Since mostly local population is employed proper education and training is being imparted to all the staff to ensure proper operation of the unit.

Economic well-being: The project leads to creation of business opportunities for local stakeholders such as bankers/consultants, suppliers/ manufacturers and contractors. The project involves an additional investment of INR 245.7 million (around USD 5.57 million) in the remote underdeveloped area which would not happen in the absence of the project activity. The contribution towards grid power stability in the region and infrastructure development would also bear related long-term economic benefits for the local population.

Technological well-being: The project activity generates power using environmentally safe small hydroelectric power technology. Its success would encourage other entrepreneurs to replicate such technologies in hilly regions of West Bengal. Moreover, it also helps in reducing the losses due to power transmission and distribution from the existing generating stations of the grid to such remote areas.

Environmental well-being: The project activity located on the eastern Himalaya does not cause any environmental disturbance or ecological imbalance. The power generation by using renewable energy avoids use of fossil fuel like coal and fuel oil for power generation leading to reduction in GHG emissions at the thermal power plants connected to grid.

Bihar, Jharkhand, Orissa, West Bengal, Sikkim has an area of 4,25,432 sq. km, which is about 13% of the total area of the country. Please refer to http://www.eastrpc.org/ for details.

A.3. Project participants:

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Name of the Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants(*) as applicable	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Government of India	Neora Hydro Limited (Private Entity)	No

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

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

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A.4.1.1. Host Party(ies):

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India

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

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West Bengal

A.4.1.3. City/Town/Community etc:

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Sakam Basti Village, Darjeeling District

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

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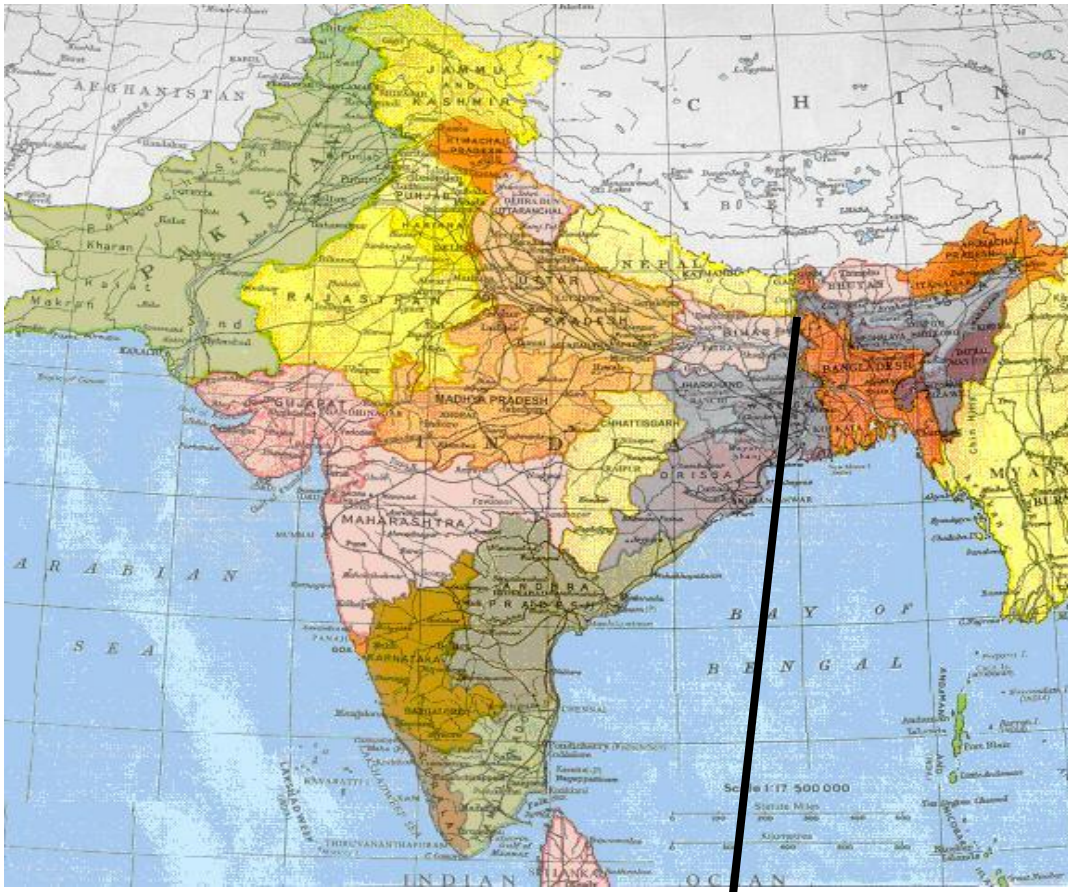
The small hydro project is located on Neora river in Sakam Basti village, Darjeeling district in northern part of West Bengal state, India. The river takes off at Raghila Pass in Darjeeling district at a altitude of 3150 metre (m) above mean sea level, flows through the dense forest and finally falls into the Teesta river. The project falls in the Samsing Forest range of lower Himalayas. The site is 17 kilometre (km) from Chalsa town which is situated on National Highway no. 31. Nearest railway station on Broad Gauge line is New Mal Junction (17km) and the nearest airport is at Bagdogra (85 km). The physical location of the project activity is shown in Fig 1 below:



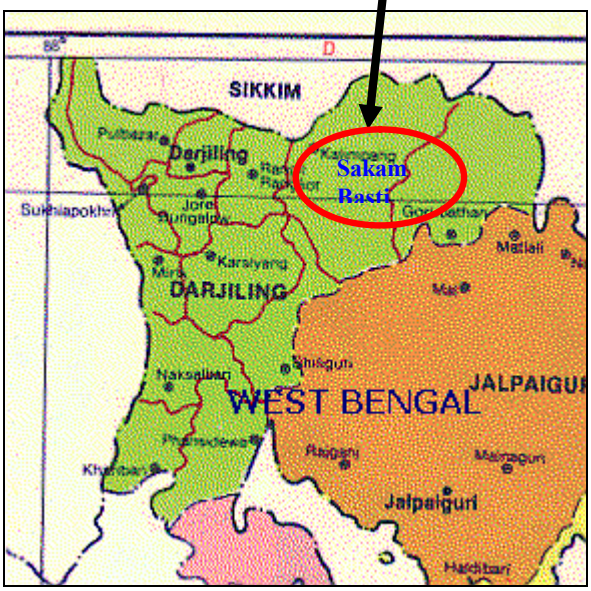


Fig. 1
Maps not to scale

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

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According to the categorization of Appendix B to the simplified modalities and procedures for small scale CDM project activities (http://cdm.unfccc.int/methodologies/SSCmethodologies) the project activity fits the type and category as specified below:

Type: *Type I – Renewable Energy Projects*

Category: *I.D. 'Grid Connected Renewable Energy Generation'*

Technology:

The technology for the project activity involves the installation of a run-of-the-river small hydroelectric power plant. The diversion structure consists of a trench type weir located on the left bank of river Neora diverting 12.51cumecs (m^3/s) of water. The desilting basin is provided at a flat location with sufficient width to achieve required de-silting velocity. The water conductor of Reinforced Cement Concrete (RCC) rectangular section of 2.6m x 2.9m and 975m long connects the desilting basin with the forebay tank. Gates and screens are used at each stage for flow control. The forebay is located along a gently sloping hill at an average elevation of 345m and leads the water to a penstock. The penstock of 1.875m diameter trifurcates near the power house and three 1.09m diameter pipes feed water to the turbines gaining a useful net head of 32m.

Power House - Mechanical Equipments: Prime mover consists of three nos. of horizontal shaft, Francis Turbines. Specification of each turbine is mentioned below:

- Type - Horizontal Francis
- Rated output - 1064 kW, 600 rpm
- Rated discharge - 4.17 cumecs
- Head - 32m

The turbine is of low speed and therefore no speed gearing is envisaged between turbine and the generator. The main inlet valve is operated by a butterfly valve. Each turbine is equipped with a highly sensitive electronic governor for accurate control of speed and load. The turbine and generator are connected with a flexible coupling together with the flywheel. The auxiliary equipment of the power house include dewatering and drainage system, safety devices, instrumentation, start-up power, cooling water system, etc. The tail water is discharged to river Neora at an elevation of 313m through a 40m long tail race channel.

Power House - Electrical Equipments: Three sets of 3-phase horizontal shaft synchronous generators with cylindrical rotor, brushless excitation and self ventilated system are provided. The basic design parameter of each generator is as follows:

- Type - Horizontal shaft Synchronous with brushless excitation and Automatic Voltage Regulator.
- Rated Capacity - 1000 kW
- Rated Voltage - 3.3 kV
- Frequency - 50 Hz.
- Power factor - 0.80 lag

Control Room with all protection and metering facilities and other auxiliary equipments will also be made available.

Power Evacuation System: The power generated at 3.3kV is stepped up to 11kV by 3 generator transformers of 1.5 MVA each. An 11kV overhead double circuit transmission line evacuates power from the power station to WBSEB substation at Chalsa situated 17 km away. A Time of Day (TOD) meter is provided at the substation for measurement of electrical energy that may be exported or taken in from WBSEB system.

Technology transfer:

There is no technology transfer from other countries involved in the project activity.

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

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Years	Estimation of annual emission reductions in tonnes of CO_2 e
June 2007- March 2008	10675
March 2008- April 2009	12810
March 2009- April 2010	12810
March 2010-April 2011	12810
March 2011-April 2012	12810
March 2012- April 2013	12810
March 2013- April 2014	12810
March 2014- April 2015	12810

March 2015- April 2016	12810
March 2016- April 2017	12810
March 2017 – May 2017	2135
Total estimated reductions CO_2 e	**125965**
Total number of crediting years	**10**
Annual average of the estimated reductions over the crediting period (tCO_2 e)	**12596.5**

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

There is no public funding available from any Annex I party for the project activity.

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

The project proponent hereby confirms that the proposed project activity is not a debundled component of a larger project activity. Neither is a project activity registered nor there is an application to register another small scale CDM project activity:

- from the same project participant
- in the same project category and technology/measure and
- registered within the previous 2 years, and
- whose project boundary is within 1 km of project boundary of the proposed small scale activity at the closest point

SECTION B. Application of a baseline and monitoring methodology

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

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Title of Approved Baseline Methodology: 'Grid Connected Renewable Electricity Generation'

Reference of the Approved Baseline Methodology: Category I.D - Renewable Energy Projects – Version 10 of AMS –I.D., dated 23 December 2006 of the Appendix B of Simplified Modalities and Procedures (M & P) of Small Scale CDM Project Activities.

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

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As per Appendix B of Indicative Simplified Monitoring and Baseline Methodologies, 'renewable energy generating units 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' come under Category I.D.

The project activity involves generation of power by harnessing hydro potential which is a form of renewable energy and exporting this power to the Eastern Regional grid. In Eastern Regional Grid around 89 % of power is supplied by thermal power plants like coal and gas (please refer to Central Electric Authority (CEA) CO_2 Baseline Database, Version 1.1 Dated 21 December 2006 available at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm for details).

The power generated by the project activity helps in displacing electricity that would have been supplied by the thermal power plants connected to the grid. Thus, the project activity meets the applicability conditions of the Baseline Methodology of AMS I.D.

As the capacity of hydel power generation through the project activity is 3 MW, which is less than stipulated 15 MW[3], the project activity falls under the small scale CDM project activity as per Appendix B of the simplified modalities and procedures for small –scale CDM project activities of UNFCCC.

The Methodology is applied in the context of the project activity as follows:

I. Baseline Emissions: The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient measured in kg CO_2 equivalent/kWh. Two methods are provided for category I.D for estimating the emission coefficient in a transparent and conservative manner. They are:

a. The average of 'approximate operating margin' and the 'build margin', or
b. The weighted average emissions in kg CO_2/kWh of the current generation mix.

Since the project activity affects both current and future generation mix of the grid, the project proponent decides to use Option a. - the average of 'approximate operating margin' and the 'build margin', for estimating the emission coefficient of the electricity distribution system. Details of baseline calculations are provided in Section B.4. of the PDD.

II. Project Boundary: The project boundary encompasses the physical, geographical site of the renewable generation source. The details are provided in Section B.3. of the PDD.

[3] Reference: Paragraph 2 of small scale methodology AMS I.D.
(http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_SF2SIJB6UANOO4Z7KM1WH9YEEKKK94)

III. Additionality: The additionality aspects for the project activity have been discussed in accordance with Attachment A to Appendix B in Section B.5. of the PDD.

IV. Monitoring: The detailed Monitoring plan for the project activity is provided in Section D of the PDD.

V. Emission Reductions: Since there are no project emissions or leakage associated with the project activity, the Emission Reductions are equivalent to the baseline emissions avoided for that particular year. The detailed emission reduction calculations are provided in Section B.5 of the PDD.

B.3. Description of the project boundary:

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As per paragraph 6 of AMS I.D of Appendix B, the project boundary encompasses the physical and geographical site of the renewable generation source.

Hence for the project activity, the project boundary consists of the diversion weir, desilting chamber, forebay, penstock, power generation house, tail race canal and the power evacuation system up to the grid substation.

Further, for the purpose of estimation of baseline emissions, the Eastern Regional Grid of India has been considered within the system boundary.

B.4. Details of baseline and its development:

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According to paragraph 9 of the small scale methodology AMS I.D, the baseline of the project activity is the kWh generated by the project activity multiplied by the emission factor of the regional grid in which it displaces the electricity.

The emission factor of the grid, according to the outlines of the methodology, is calculated in a transparent and conservative manner as a combined margin which is calculated as the average of the operating margin and the build margin. The detailed calculations of the operating and build margins have been provided in CEA CO_2 Baseline Database, Version 1.1, dated 21 December 2006. Please refer to Annex 3 for details.

The baseline emissions are calculated according to the equation (7) as provided in section B.6.1.

Parameters required for calculation of baseline emissions:

Serial number	Variable	Parameters	Data sources
1	EF_y	Electricity baseline emission factor	Calculated according to the guidelines of ACM 0002. The value for the emission factor has been sourced from the CEA CO_2 Baseline Database, Version 1.1 dated 21st December 2006.
2	EG_y	Total energy exported to grid	Power export bills

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:

Project Additionality:

The additionality aspects of the project are discussed below in accordance with Attachment A of Appendix B of the simplified M & P for small scale CDM project activities.

a. Investment Barrier:

1. During project conception phase, the total project cost was estimated at Rs.245.7 million with a debt equity ratio of 66:34. NHL raised major portion of its debts (around Rs.97.2 million) from Indian Renewable Energy Development Agency (IREDA) as term loan. On a later stage, NHL expected further increase in capital cost due to the anticipated barriers during project implementation (see discussion below for details). Hence, on approaching IREDA for further funding, IREDA suggested NHL to explore funding opportunities through the CDM route[4]. Consequently, NHL decided to undertake the project as a CDM project to overcome the risks associated with project.

2. Apart from IREDA, NHL approached other banks and financial institutions (FIs) for sourcing the remaining portion of debt. However, banks and FIs showed lack of interest towards NHL application. In one such instance, NHL had applied to UTI Bank Limited for granting a loan of Rs.65 million[5]. NHL

[4] Source: Letter from NHL to IREDA dated 18th December 2002 and reply of IREDA dated 13th January 2003.

[5] Source: Application of Neora to UTI, letter dated 23rd Nov 2005.

provided the bank with all details like detailed project report, project cost, projected cash flow and profitability statement. However, the bank scrutinized the case and expressed their inability to fund the same[6].

3. No evacuation demand: The project activity exports power through WBSEB grid sub-station situated at Chalsa. Chalsa grid is connected to local loads which have high uncertainty of continuity of demands depending on the time of day. Hence, the lower demand on the evacuating Chalsa grid can lead to lower utilization of power generation capacity of the project activity leading to a loss of revenue and making it financially less viable.

4. Scheduling of Load Desptach: WBSEB is the state government owned generation, transmission and distribution agency in West Bengal which also controls the State Load Despatch Centre[7]. Apart from the project activity, the Chalsa sub-station is also directly connected with a WBSEB owned power plant at Jaldhaka. Hence, during co-ordination of the drawal schedule, WBSEB may give priority to its own Jaldhaka facility over the NHL project activity. This could again lead to lower capacity utilization leading to loss of revenue from the project activity.

5. The Tea Gardens form a major part of the load (*i.e.* demand) in the Chalsa Grid. However, these gardens are frequented with protracted strikes leading to lower power drawal from project activity by the sub-station[8].

6. During project design stage, the interconnection between the power station and grid sub-station, located 17 km away, was to be undertaken by installing 11kV overhead double circuit line on steel tubular poles (STP). However, due to increase in project costs, only one 11kV overhead transmission line could be constructed at present. As this life line evacuation system passes through the hilly area and is drawn through remote inaccessible locations, there will be highest uncertainty of availability during storms and in monsoon period. The other transmission line would be considered only after the project starts earning revenues.

7. Line Loss and voltage drop: The Chalsa grid sub-station operates at 11kV. The power generated at 3.3kV will be stepped-up to 11kV and transmitted at that voltage. Due to transmitting power at such low

[6] Source: Response from UTI bank dated 13th Dec 2005.

[7] Source: WBSEB Annual Report 2004-05

[8] Refer: http://www.umanitoba.ca/institutes/natural_resources/canadaresearchchair/thesis/ltirkey%20masters%20thesis%202005.pdf

voltages over large distance, a design line loss of 7 % has been considered in addition to a voltage drop. The heavy line losses would mean direct loss of revenue to the project proponent.

The documentary evidences for the above are available with NHL and can be shown on request.

b. Prevailing Practice: The northern part of the West Bengal state has abundant snow and monsoon fed rivers with immense hydro power potential yet to be tapped. Among the similar economic, geographical and technological circumstances, Neora Hydro project is the first private hydro-electric power project to be set-up in the state of West Bengal[9].

c. Other Barriers:

1. Regulatory/Institutional Barriers:

A. As the project activity is the first private project of its kind in the state, the project proponent had to face numerous regulatory barriers since no proper regulatory systems are in place in the State. The project proponent faced difficulties with regard to:

i) Land Acquisition from Forest Department, Government of West Bengal
ii) Procedures for obtaining lease / mortgage land, compulsory afforestation of non forest land, payment of land revenue with interest to the Block & District Land revenue officer
iii) Use of Forest and Tea Estate Lands for transportation
iv) Blasting license and jungle clearing license.
v) Obtaining frequency allotment and license for Very High Frequency (VHF) operation for communication with grid sub-station.

With no suitable regulatory systems in place, the considerable delay in obtaining each of the approvals led to time and cost overruns.

B. Delay in finalizing the Power Purchase Agreement (PPA): A new electricity framework called the Electricity Act was passed in India in June 2003 to usher in power sector reforms. As per the Act, State Electricity Regulatory Commission (SERC) shall determine the tariff for renewable energy projects selling

[9] Source: West Bengal Infrastructure Development Corporation and ICICI Bank Report - http://72.14.203.104/search?q=cache:DvvDffI9p28J:www.icici-winfra.com/iwin/busgr51j2-45.htm+Neora+first+hydro&hl=en&gl=in&ct=clnk&cd=4

power to grid. However, only on 13th Jan 2006 the Commission (*i.e.* WBERC) had come up with a draft notification on regulations for renewable sources of energy. Although the draft notification itself assured the final notification, the final notification was made available after a long time only on 4th May 2006. As a result there was a considerable time delay between the time of project planning and the finalization of PPA during which the project promoters were in a state of much uncertainty. The project proponents hence relied on CDM revenue to provide coverage to this delay and uncertainty.

2. Locational barriers: The project activity is located in a remote area of lower Himalayas of Darjeeling district in West Bengal, within a hilly forest. Due to the unfavorable location, the project proponent had to face the following problems:

i) The project proponent had to construct the approach road to project site for transportation of man and materials and also put up a 17km long transmission system through the hilly terrain leading to time delay and cost overruns.

ii) Due to peculiar location and the project being run-of-the river, there are chances of unforeseen landslide and flash floods which may cause stoppage of generation for a prolonged period. Such instances have occurred in the past[10].

iii) Telecommunication facility is poor at the site leading to communication problems with main land.

Impact of CDM Revenues:

As discussed above, the project proponent had to face a number of technological and regulatory barriers during project implementation phase leading to increased capital costs and time delay. The project activity getting registered as a CDM project would help the project proponent earn revenues through sale of carbon credits and make up for the enhanced costs incurred.

For the successful operation of the project activity, the project proponent will have to invest continuously in preventive and breakdown maintenance, more so in the event of a calamity. A second overhead transmission line will also have to be installed to provide redundancy for power transmission. Investments will also have to be made on a regular basis on training and skill development of employees manning the

[10] Heavy land and rock slide occurred on 12th June 2004 leading to damage of constructed structures of the project.

power station. The project proponent could get the necessary funding for these expenditures from the sale of CERs.

The project activity being the first private sector venture in the state to implement the small hydro project, a number of regulatory barriers were faced by the project proponent while obtaining clearances/approvals from various government bodies. Project activity getting registered as a CDM project would give it instant visibility among state electricity ministries/departments, WBERC, environment and forest ministries/departments, enabling NHL to face lesser governmental hurdles in future.

Overall the success of the project activity, would act as a precursor for other private enterprises to invest in small hydro projects in the state leading to further reduction in GHG emissions.

It is ascertained that the project activity would not have occurred in the absence of the CDM incentives simply because of lack of sufficient financial, policy, or other incentives to foster its development in West Bengal and without the proposed carbon financing for the project, NHL would not have taken the investment risks to implement the project activity. Moreover, the impact of CDM registration is significant with respect to sustainable operation of the project activity. Therefore the project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The Methodology is applied in the context of the project activity in order to calculate the baseline emissions, project emissions, leakages and emission reductions as follows:

I. Baseline Emissions: According to the methodology the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient measured in kg CO_2 equivalent/kWh. Two methods are provided for category I.D for estimating the emission coefficient in a transparent and conservative manner as follows:

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

b. The weighted average emissions in kg CO_2/kWh of the current generation mix.

Since the project activity affects both current and future generation mix of the grid, the project proponent opts to use Option a. - the average of 'operating margin' and the 'build margin', for estimating the emission coefficient of the electricity distribution system.

Emission Factor of the Grid (EF_y)

Electricity baseline emission factor of Eastern regional grid (EF_y) has been calculated by the Central Electric Authority (CEA) of India (Central Electric Authority: CO2 Baseline Database, version 1.1 dated 21st December 2006) as per the guidelines of ACM0002/Ver 06. The same emission factor for the grid has been used for calculation of emission reductions. For details please refer to Annex 3 of this project document.

Baseline Emission Calculations

The Baseline Emission is calculated as,

$$BE_y = EG_y \otimes EF_y \quad \text{..... (7)}$$

where,

BE_y = Baseline Emissions due to displacement of electricity during the year y (in tCO_2)

EG_y = Net units of electricity substituted in the grid during the year y (in MWh)

EF_y = Emission Factor of the grid (in tCO_2/ MWh) and

y is any year within the crediting period of the project activity

II. Project Emissions: The project activity is a run-of-river hydroelectric project. There are no anthropogenic emissions by sources of GHGs in the project boundary as a result of the project activity.

III. Leakage Emissions: There are no anthropogenic emissions identified by sources outside the project boundary. Further, the project proponent confirms that the equipments used by the project activity are not transferred from another project. Hence, there is no leakage calculation required for the project activity.

IV. Emission Reductions: The emission reductions of the project activity are calculated as the difference between the baseline emissions and the project emissions.

$$ER_y = BE_y - PE_y \text{..... (8)}$$

where,

ER_y = emission reductions for the project activity in tonnes of CO_2 e

BE_y = Baseline emissions in tonnes of CO_2 e

PE_y = Project emissions in tonnes of CO_2 e = 0

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

Data / Parameter:	EF_y
Data unit:	tCO_2/ MWh
Description:	CO_2 emission factor of the grid
Source of data used:	CO2 Baseline Database Version 1.1, Dated 22nd December 2006 (Combined Margin Emission Factor for Eastern Regional Grid) published by Central Electric Authority (CEA), India
Value applied:	1.05
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information available from authorised government agencies – National standard value has been calculated by Central Electricity Authority (CEA) as per guidelines of ACM0002 methodology.
Any comment:	Please refer Annex 3 of PDD for details.

B.6.3 Ex-ante calculation of emission reductions:

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1. Estimation of GHG emission by sources:

Sl. No.	**Operating Year**	**Project Emission (tonnes of CO_2 e)**
1.	June 2007 – March 2008	0
2.	March 2008- April 2009	0
3.	March 2009-April 2010	0
4.	2010-2011	0
5.	2011-2012	0
6.	2012-2013	0
7.	2013-2014	0
8.	2014-2015	0
9.	2015-2016	0
10.	2016 -2017	0
11.	March 2017 – May 2017	0

Sl. No.	Operating Year	Project Emission (tonnes of CO_2 e)
Total		**0**

2. Estimation of Leakage:

As mentioned earlier, no leakage is associated with the project activity.

3. Estimation of Project Activity Emissions:
The total emissions by project activity (1+2) for the 10-year crediting period is given tabulated below.

Sl. No.	Operating Year	Project Activity Emissions (tonnes of CO_2 e)
1.	June 2007 – March 2008	0
2.	March 2008- April 2009	0
3.	March 2009-April 2010	0
4.	2010-2011	0
5.	2011-2012	0
6.	2012-2013	0
7.	2013-2014	0
8.	2014-2015	0
9.	2015-2016	0
10.	2016 -2017	0
11.	March 2017 – May 2017	0
Total		**0**

4. Estimation of Baseline Emissions:

Sl. No.	Operating Year	Baseline Emission (tonnes of CO_2 e)

Sl. No.	Operating Year	Baseline Emission (tonnes of CO_2 e)
1.	June 2007 – March 2008	10675
2.	March 2008- April 2009	12810
3.	March 2009-April 2010	12810
4.	2010-2011	12810
5.	2011-2012	12810
6.	2012-2013	12810
7.	2013-2014	12810
8.	2014-2015	12810
9.	2015-2016	12810
10.	2016 -2017	12810
11.	March 2017 – May 2017	2135
Total		**125965**

5. Estimation of emission reductions:

Difference between 4 and 3 representing project activity emission reductions:

Sl. No.	Operating Year	Emission Reductions (tonnes of CO_2 e)
1.	June 2007 – March 2008	10675
2.	March 2008- April 2009	12810
3.	March 2009-April 2010	12810
4.	2010-2011	12810
5.	2011-2012	12810
6.	2012-2013	12810
7.	2013-2014	12810

Sl. No.	Operating Year	Emission Reductions (tonnes of CO_2 e)
8.	2014-2015	12810
9.	2015-2016	12810
10.	2016 -2017	12810
11.	March 2017 – May 2017	2135
Total		**125965**

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

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Years	Estimation of project activity Emissions (tonnes of CO2 e)	Estimation of baseline Emissions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2 e)	Estimation of overall emission reductions in tonnes of CO_2 e
2007 - 2008	0	10675	0	10675
2008-2009	0	12810	0	12810
2009-2010	0	12810	0	12810
2010-2011	0	12810	0	12810
2011-2012	0	12810	0	12810
2012-2013	0	12810	0	12810
2013-2014	0	12810	0	12810
2014-2015	0	12810	0	12810
2015-2016	0	12810	0	12810
2016-2017	0	14945	0	14945
Total (tonnes of CO_2 e)	**0**	**125965**	**0**	**125965**

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:	**EG_y**
Data unit:	kWh
Description:	Power Exported to grid from the project activity
Source of data to be used:	Power Export Bills
Value of data	12.2×10^6
Description of measurement methods and procedures to be applied:	The data will be recorded by a Time of Day (T.O.D) meter at the West Bengal State Electricity Board (WBSEB) grid substation. The meter will be calibrated and maintained by WBSEB. Records of sales bills will be used as evidence for power exported to WBSEB grid
QA/QC procedures to be applied:	Yes
Any comment:	This data will be used for determining the power fed to the grid and hence the emission reductions. The T.O.D Meters will be maintained and calibrated by WBSEB.

B.7.2 Description of the monitoring plan:

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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 the archived data to be kept	Comments
B.7.2-1	Quantitative	Power Exported	kWh	m	Monthly	100%	Paper (Power Export bills)	During credit period + two years thereafter	The data will be recorded by a Time of Day (T.O.D) meter at the WBSEB grid substation. The meter will be calibrated and maintained by WBSEB. Records of sales bills will be used as evidence for power exported to WBSEB grid.

Organization structure for data monitoring

Data for the project activity will be recorded and monitored by the shift engineers/panel operators which will then be reviewed by the power plant in-charge and finally communicated to the Director (Projects).

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

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Date of completion of the application of the baseline and monitoring methodology: 30/01/2007

Name of person responsible: Mr. Gaurav Agarwala, Managing Director, Neora Hydro Limited (as listed in Annex I of the PDD)

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:

>>

January 2004

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

>>

35 y 0 m

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

C.2.1. Renewable crediting period

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

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> 01/06/2007 (after registration of project activity with UNFCCC)

C.2.2.2. Length:

>>

10 y 0 m

SECTION D. Environmental impacts

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

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As per the Environmental Impact Assessment (EIA) Notification of the Ministry of Environment and Forests, Government of India, the river valley projects with investment of less than Rs. 500 million, which is the project case, do not require EIA submission. However, the project has obtained the Consent to Establish (i.e. the No Objection Certificate) from the West Bengal Pollution Control Board (WBPCB). The scheme being run-of-the- river type, it will not adversely affect the ecological characteristics of the area. No human displacement is involved in the project and hence no problem of resettlement is envisaged. The scheme on the other hand will improve the socio-economic condition of the nearby locality. The project activity is thus completely eco-friendly.

SECTION E. Stakeholders' comments

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

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The stakeholder views form a valuable input to reaffirm NHL's core objective of developing renewable sources of energy for sustainable development.

The following were the stakeholders were identified for the project activity:

- Elected body of representatives administering the local area (village *Panchayat*)
- Employees of Neora Hydro Limited
- West Bengal Electricity Regulatory Commission (WBERC)
- West Bengal Renewable Energy Development Agency (WBREDA)
- West Bengal State Electricity Board (WBSEB)
- Indian Renewable Energy Development Agency (IREDA)
- West Bengal Pollution Control Board (WBPCB)
- Environment Department, Government of West Bengal
- Ministry of Non Conventional Energy Sources (MNES)
- Non-Governmental Organisations (NGOs)
- Banks and Financial Institutions, and
- Consultants

In the context of the project activity, NHL has consulted some of the key stakeholders among the above and has recorded them.

E.2. Summary of the comments received:

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NHL has received positive feedback from the local authorities and employees on the project activity. The roles of the local people are as the beneficiary of the project. The project will neither cause any displacement of the local population nor will affect the ecological characteristics of the area. On the contrary, it would provide stability of grid power in the hilly areas surrounding the project activity. In addition, it would provide employment to the locals. The local populace thus holds positive opinion about the project.

Further, NHL has also obtained the necessary clearances like No Objection Certificate (NOC) from the West Bengal Pollution Control Board. Indian Renewable Energy Development Agency (IREDA), a government body under the Ministry of Non Conventional Energy Sources (MNES) of India has provided the loan assistance to the project activity in view of the project's sustainability criteria.

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

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NHL has received positive comments from the local stakeholders on the project activity. The relevant comments and important clauses mentioned in the project documents/clearances like Detailed Project Report (DPR), environmental clearances, local clearance etc. were considered while preparation of CDM project development document.

As per UNFCCC requirement this Project Design Document (PDD) will be published at the validator's web site for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Neora Hydro Limited
Street/P.O.Box:	Camac Street
Building:	Suite 3C, 14 B,
City:	Kolkata
State/Region:	West Bengal
Postfix/ZIP:	700 017
Country:	India
Telephone:	+91 – 33 - 2280 9435
FAX:	+91 – 33 - 2280 9436
E-Mail:	neorahydro@rediffmail.com
URL:	-
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Agarwala
Middle Name:	-
First Name:	Gaurav
Department:	-
Mobile:	-
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	-

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

THERE IS NO PUBLIC FUNDING FOR THE PROJECT ACTIVITY.

Annex 3

BASELINE INFORMATION

For the project activity the baseline scenario involves electricity consumption which entails GHG emissions. As per the simplified methodology AMS I D, for grid power generation as baseline scenario the Emission Factor for the displaced electricity system is calculated as per ACM0002 baseline methodology. The project proponent proceeds to determine the Emission Factor for the electricity system it imports power from.

A) Choice of the grid that will be affected by the project activity

Indian power grid system (or the National Grid) is divided into five regional grids namely Northern, North Eastern, Eastern, Southern and Western Region Grids. These regional grids have independent state Load Dispatch Centres (LDCs) that manage the flow of power in their jurisdiction. Power generated by state owned generation units and private owned generation units is consumed by the respective states. The power generated by central sector generation plants is shared by all states forming part of the grid in a fixed proportion.

The project activity hosting plant NHL is connected to the Eastern Regional Grid network of India. The Eastern Regional Grid consists of state grids of Bihar, Jharkhand, Orissa (GRIDCO), West Bengal (including DPL), and Sikkim; central generating stations of Damodar Valley Corporation (DVC) and National Thermal Power Corporation (NTPC) and private sector grids of CESC and DPSCL[11].

Since the baseline involves import of power drawn from the Eastern Regional Grid, the project proponent will be required to use the carbon intensity of the entire Eastern Regional grid as the baseline emission factor for baseline emission calculations over the proposed project activity's crediting period.

Furthermore, the as per ACM0002 (Version 6), *"In large countries with layered dispatch systems (e.g. state/provincial/regional/national) the regional grid definition should be used. A state/provincial grid definition may indeed in many cases be too narrow given significant electricity trade among states/provinces that might be affected, directly or indirectly, by a CDM project activity."*

[11] Eastern Region Load Despatch Centre (ERLDC) Annual Report- http://www.erldc.org/report/AR_03-04.pdf

Taking into consideration both the points mentioned above (i.e. the relevant grid displaced by the project activity and the guidelines for selection of the appropriate grid in large countries with layered dispatch systems like India as given in ACM0002), the Eastern Regional Grid has been considered as the most representative system boundary (i.e. project electricity system) where an equivalent amount of electricity would be replaced by the implementation of the proposed project activity. The carbon intensity of the Eastern Regional Grid would be determined to arrive at the baseline emission factor for baseline emission calculations for the project activity's crediting period.

B) Determination of the Carbon Intensity of the chosen Grid

Complete analysis of the system boundary's electricity generation mix has been carried out for calculating the emission factor of Eastern Regional Grid by Central Electric Authority (CEA) of India in its CO2 Baseline Database Version 1.1 dated 21st December 2006. The project proponent has used this analysis for computation of the grid emission factor. For more information please refer to http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm .

The combined margin grid emission factor computed from the above analysis is thus 1.05 for the Eastern Regional Grid.

Annex 4

MONITORING INFORMATION

Please refer to monitoring table in section B.7.2.

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.
B.7.2-1	Low	Yes	This data will be used for determining the power exported to the grid and hence this is an important factor for the calculation of emission reductions. The T.O.D Meters will be maintained and calibrated by WBSEB.

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