CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Nimoo-Bazgo Hydroelectric Project

Version 11

31 March 2009

A.2. Description of the project activity:

The proposed project activity involves the construction of a hydroelectric run-of-river plant of 45 MW in India. Three turbines of 15 MW will be installed to generate clean and reliable electric power that will be sent to the Northern Grid. As power from the project will displace power generation using fossil fuels elsewhere on the grid, the project activity will lead to a reduction in greenhouse gas emissions.

National Hydroelectric Power Corporation Ltd. (NHPC) will be developing the proposed project activity. NHPC is a Government of India Enterprise that was incorporated in 1975. Its objective is to plan, promote and organise an integrated and efficient development of hydroelectric power in all aspects. Later on NHPC expanded its objectives to include other sources of energy like Geothermal and Tidal, among others.

The implementation of the project activity will contribute to

1. The replacement of thermal power generation (from coal and diesel) elsewhere on the grid. This will reduce emissions from fossil fuels combustion.
2. The improvement of basic living conditions (due to availability of electricity) and educational standard (people working on the project will be educated and trained).
3. The economic development of the region.

As a conclusion, the project activity will bring several environmental and socioeconomic benefits thus contributing to the sustainable development of the region.

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 (host)	National Hydroelectric Power Corporation Ltd. (public)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

India

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

Jammu & Kashmir State

A.4.1.3. City/Town/Community etc:

Alchi Village in Leh District

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

Jammu and Kashmir State is the northern extremity of India, and is situated between 32.17 degree and 36.58 degree north latitude and 37.26 degree and 80.30 degree east longitude, see Figure 1.

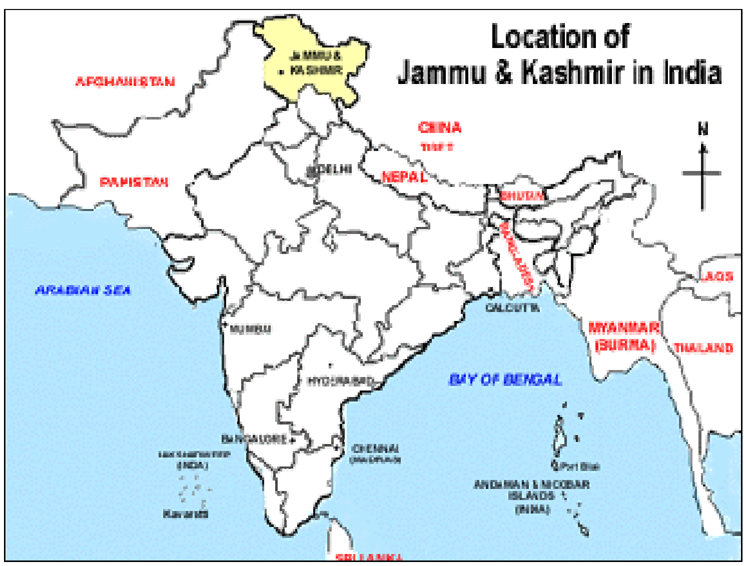

Figure 1: Jammu & Kashmir State in India (light yellow area)

Leh District, where Nimoo Bazgo Project is located, within Jammu & Kashmir State can be seen in Figure 2. Leh district is 434 km from Srinagar and comprises of Leh town and 113 villages.

Figure 2: Location of Leh District in Jammu & Kashmir

Figure 3 shows Nimoo Bazgo Hydroelectric Project located in Jammu and Kashmir.

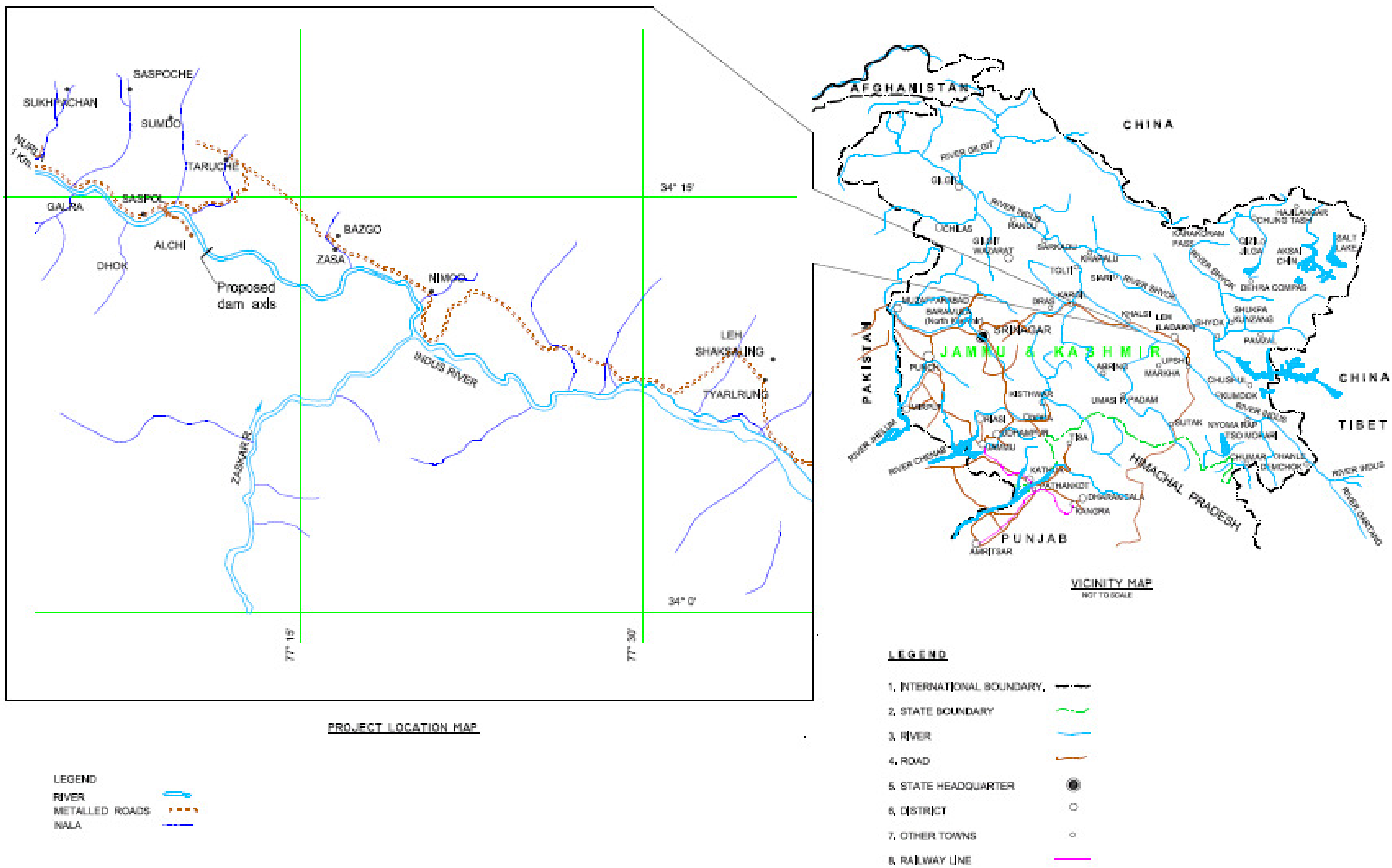

Figure 3: Map of Jammu & Kashmir showing the location of Nimoo Bazgo Hydroelectric Project

A.4.2. Category(ies) of project activity:

The most likely category would be: "(1) Energy industries (renewable/non-renewable sources)"

A.4.3. Technology to be employed by the project activity:

Nimoo Bazgo Hydroelectric Project would harness the hydropower potential of river Indus in Leh district of Jammu & Kashmir. The project envisages utilizing a rated net head of 34 m to generate 239.30GWh in a 90% dependable year with an installed capacity of 45 MW (three turbines of 15MW each). This is equivalent to a plant load factor (or capacity factor) of 60.7%.[1] Each operating unit will be designed for a discharge of 48.7 cubic metres per second.

The project will be connected to the Northern grid through a 220 kV transmission line from Leh to Srinagar (the line is scheduled for commissioning with project commissioning).

The expected date of commissioning is August 2010. Technical features of the hydroelectric power station are listed below:

- Concrete Gravity Dam 57 m high
- Three Penstock Intake
- Three Penstock of 3.3 m diameter
- Surface Power House
- Tail Pool
- Transformer Yard
- Switch Yard

The turbines are vertical shaft, Francis type with estimated machine availability of 95%[2]. The generator is vertical shaft umbrella type, salient pole type, 50Hz and directly coupled to a turbine. It will be rated for an output of 15 MW at a power factor of 0.90 and rated voltage of 11 kV.

The project is a run-of-river hydro project. The dam diverts water from the river and involves a flooding of only 3.42 km^2. Thus the power density[3] is 45 MW per 3.42 km^2, i.e. 13.16 W/m^2.

The hydroelectric project is to be provided with emergency D.G Sets (diesel) to be used when none of the units is operating. This condition is foreseen in case of tripping of the station on fault and not for any routine use. Even during winter season, the station shall run, but on reduced capacity. The following is the size of D.G. Sets provided at the project: 2X500kVA (one main and one standby).

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[1] Calculated as follows: PLF = (239.3 x 1000)/(45 x 8760).

[2] Source: Detailed Project Report for Nimoo-Bazgo Hydroelectric Project.

[3] Source: Chapter 2: Salient Features - Detailed Project Report for Nimoo-Bazgo Hydroelectric Project.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

Nimoo Bazgo Hydroelectric Project will reduce an average of 187,893 tCO_2 per year. The following table shows the *ex-ante* estimate of emission reductions for the first 7-year crediting period. Note that actual emission reductions will be based on monitored data and may differ from the estimated ones.

Table 1: Estimated emission reductions during the first crediting period

Year	Annual estimation of emission reductions (tonnes of CO_2e)
August 2010- July 2011	187,893
August 2011- July 2012	187,893
August 2012- July 2013	187,893
August 2013- July 2014	187,893
August 2014- July 2015	187,893
August 2015- July 2016	187,893
August 2016- July 2017	187,893
Total estimated reductions over the first crediting period	**1,315,254**
Total number of crediting years	7
Annual average of estimated emission reductions (tCO_2e)	**187,893**

A.4.5. Public funding of the project activity:

No funds from international multilateral or bilateral assistance will be involved in any aspect of the proposed CDM project activity. No ODA funding is sought.

SECTION B. Application of a baseline and monitoring methodology

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

The project activity uses an existing consolidated baseline and monitoring methodology. The methodology is designated ACM0002: ***"Consolidated methodology for grid-connected electricity generation from renewable sources – version 6".***

According to the methodology, the assessment of additionality shall be done by applying the "Tool for demonstration and assessment of additionality-version 4"

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

ACM0002 (version 6) is applicable to grid-connected renewable power generation project activities under the following conditions:

The proposed project activity meets all applicability conditions required by the methodology, as follows:

1. The project involves the construction of a run-of-river hydro power plant. Its power density is 13.16 W/m^2 (as shown in section A.4.3).
2. The project does not involve switching from fossil fuels to renewable energy at the site of the project activity.
3. The geographic and system boundaries for the Indian Electricity Grid can be clearly identified and information on the characteristics of the grid is available.

Therefore, the proposed project activity complies with the applicability conditions of the methodology.

B.3. Description of the sources and gases included in the project boundary

The project boundary comprises the physical site of the power plant and the reservoir area. The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project is connected to.

Emission sources included in the project boundary are:

	Source	Gas	Included?	Justification / Explanation
Baseline	Electricity Grid	CO_2	Yes	CO_2 emissions derived from the Northern Grid of India that will be displaced due to the implementation of the project activity.

As the project power density[4] of 13.16 W/m^2 of flooded area (as shown in section A.3) is higher than 10 W/m^2, project emissions from the reservoir may be neglected, according to EB 23 Annex 5.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

As required by the Tool for demonstration and assessment of additionality (version 4), the baseline scenario identification consists of completing three steps. They are analyzed below.

[4] Source: Chapter 2: Salient Features – Detailed Project Report for Nimoo Bazgo Hydroelectric Project.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity

The identified baseline alternatives are:

Alternative 1- Implementation of the project activity without being registered as a CDM project activity: The project activity would be connected to the public grid and, therefore, displaces an equivalent amount of electricity of the grid mix. This is a possible baseline alternative that is discussed further in Section B.5.

Alternative 2- Continuation of current situation (no project activity implementation): As described in ACM0002 – v.6, for project activities that do not modify or retrofit an existing electricity generation facility, which is the case of Nimoo Bazgo Hydroelectric Project, the baseline scenario is the following:

> *"Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations".*

The proposed power plant is located within the Northern Region Grid. The capacity additions for this Grid are shown in Annex 3 to the PDD. Most of the installed capacity is from thermal plants that use coal or oil as fuel. There are also plants that use natural gas, hydroelectric or nuclear generation.

This is a possible baseline alternative and is discussed further in Section B.5.

Alternative 3. Other renewable generation sources, where an equivalent of electricity would be generated using other renewable energy sources, such as biomass, wind, and solar energy. The project site is a high altitude location, about 4,000 metres above sea level, with very little rainfall. This cold, desert climate provides little biomass resource that is used for food, fodder, and some use as household fuel. There is no surplus biomass resource to generate electricity in this climate, nor any possibilities of biomass plantations. While there are some wind resources in India, none of the favourable locations listed are in Ladakh. (http://www.windpowerindia.com/statwind2.html) There are no known wind generators in Ladakh, and certainly no plans for 44 MW installed capacity, equivalent to the proposed hydro project. While there have been some wind farm development in India, especially through the CDM, these are located in the South or West of the country. Electricity can also be generated directly from solar energy through thermal and photovoltaic (PV) routes. Solar thermal electricity generation is not yet a mature technology and there are no large scale installations in India. Solar photovoltaic conversion remains expensive, with virtually no scale economics so that these systems are suitable for supplying small amounts of electricity to locations far from the power grid. Grid-connected PV systems with installed capacity of 45 MW are far from cost effective compared to other power generation options. Therefore, other renewable sources of energy cannot be considered as plausible baseline alternatives.

Alternative 4. Project proponent implements fossil-fuel fired power plants. The specific project proponent is a company, called National Hydro Power Corporation, which only develops hydro projects. This can be verified in the Memorandum of Association of NHPC, which can be

downloaded from their website www.nhpcindia.com from the sub link under management. The main object of the company is listed as "Development of hydroelectric power."[5] Thus construction of fossil fuel power plants by the project proponent is not a permissible technological choice or a possible baseline alternative.

"Outcome of Step 1a: Identified realistic and credible alternative scenario(s) to the project activity."

As alternative 3 faces barriers to its implementation, and alternative 4 is not a permissible option for the project proponent, these cannot be considered as possible baseline alternatives. Then, the remaining alternatives are Alternatives 1 and 2:

Alternative 1. Implementation of the project activity without being registered as a CDM project activity.

Alternative 2. Continuation of current situation (no project activity implementation).

Both Alternatives 1 and 2 are considered further below.

Sub-step 1b. Consistency with mandatory laws and regulations:

The remaining alternative from *sub-step 1.a.* is in compliance with legal requirements as it is the continuation of the current situation.

"**Outcome of Step 1b**: Identified realistic and credible alternative scenarios to the project activity which are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations."

The alternatives remain the same as in sub-step 1.a:

Alternative 1. Implementation of the project activity without being registered as a CDM project activity; and

Alternative 2. Continuation of current situation (no project activity implementation)

"***Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both steps 2 and 3)"***

As this analysis is part of the additionality demonstration, it will be conducted in Section B.5.

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[5] Note that (a) wind and tidal and (b) geothermal and gas power plants were added in 1998 and 1999 respectively. However, these resources are not available at the project site.

The following table shows all key data used to determine the baseline scenario:

Table 2: Key data

Parameter	Data Sources
Combined margin emission factor	Central Electricity Authority Database (Official source)
Variables	**Data sources**
Net electricity generation of the hydroelectric plant per year	NHPC

For further information on key data used for baseline scenario, refer to Annex 3.

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 CDM project activity (assessment and demonstration of additionality):

As explained in section B.4, the "Tool for demonstration and assessment of additionality" version 4 is used to identify the baseline scenario and to demonstrate the additionality of the project activity. According to **Step 1**, possible alternative baseline scenarios are Alternative 1: ***Implementation of the project activity without being registered as a CDM project activity; and Alternative 2: Continuation of current situation (no project activity implementation).***

Alternative 1 implies that the proposed project scenario is indeed the baseline scenario, i.e. it is not additional. As per ACM0002 version 06, the "Tool for the demonstration and assessment of additionality-version 03" has to be applied to demonstrate the additionality of the project, i.e. that Alternative 1 is not a valid baseline scenario. To continue with the assessment of the project's additionality, Step 2 (investment analysis) and/or Step 3 (barrier analysis) and Step 4 (common practice analysis) are to be applied. The project participant chooses Step 2 followed by Step 4.

Step 2. Investment analysis

Sub-step 2a. Appropriate analysis method

Three methods to perform the investment analysis are presented in the Tool for demonstration and assessment of additionality. These are:

Option 1: simple cost analysis
Option 2: investment comparison analysis
Option 3: benchmark analysis

Option I can be used if the project activity generates no financial or economic benefits other than CDM related income, i.e. CERs. This option is not applicable because the proposed project would have revenues from electricity sale as well as CDM revenues.

Investment comparison analysis method (Option II) can only be used if the project and the alternatives to the project activity are all investment projects. However, this option is not applicable to the project because the alternative to the project activity is equivalent annual

electricity supplied by the Northern Region Power Grid. The latter alternative is not a new investment project.

Therefore, the only applicable analysis method to the project is benchmark analysis (Option III).

Sub-step 2b. – Option III. Apply benchmark analysis

The additionality tool requires an identification of the most appropriate financial indicator. For the case of a power plant that would supply energy to the grid, the most appropriate indicator is the internal rate of return (IRR). As indicated in the Additionality Tool, version 4, the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). We use the project IRR.

Table 3 presented below lists all the parameters, values used for carrying out the investment analysis along with their respective sources.

Table 3: Input Values used in the Investment Analysis

Sl. No.	Parameters	Values	Source
1.	Electricity generation	236.94 GWh	Detailed project report (DPR) of February 2004, page 2
2.	Plant Load factor	60.71%	Detailed project report (DPR) of February 2004, page 2
3.	Project Cost	INR 611 crores	Cost estimate abstract of December 2005 (Cost abstract Nimoo Bazgo.pdf)
4.	Equity	INR 183. 30 crores	Approval letter for the Nimoo-Bazgo hydropower project from the Ministry of Power, Government of India dated 24 August 2006 (Proof - Equity Nimoo Bazgo.pdf)
5.	Commercial Loan	INR 157.71 crores	Approval letter for the Nimoo-Bazgo hydropower project from the Ministry of Power, Government of India dated 24 August 2006 (Proof - Equity Nimoo Bazgo.pdf)
6.	Subordinate Loan	INR 270 crores	Letter regarding the sub-ordinate loan from the Ministry of Power, Government of India, dated 23 November 2006 (Proof Sub Loan & project cost Nb.pdf)
7.	Electricity Tariff	INR 2.71/kWh	Central Electricity Regulatory Commission guidelines of 26 March 2004 (http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf) Chapter 3 CERC regulation page no 37 to 40, included as annex 2.
8.	Depreciation Charges	INR 15.41 crores	Central Electricity Regulatory Commission guidelines of 26 March 2004 (http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf) Chapter 3 CERC regulation page no 37 to 40, included as annex 2.
9.	Return on Equity (ROE)	14%	Central Electricity Regulatory Commission guidelines of 26 March 2004 (http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf) Chapter 3 CERC regulation page no 37 to 40, included as annex 2.
10.	Interest on working capital	10.25% (INR 1.80 Crores)	Central Electricity Regulatory Commission guidelines of 26 March 2004 (http://www.cercind.gov.in/28032004/finalregulations_terms&con

			dition.pdf) Chapter 3 CERC regulation page no 37 to 40, included as annex 2.
11.	Operation & Maintenance Charges	INR 9.71 Crores	Central Electricity Regulatory Commission guidelines of 26 March 2004 (http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf) Chapter 3 CERC regulation page no 37 to 40, included as annex 2.
12.	Interest on Loan	8%	As per Rural Electrification Corporation Limited applicable for all public sector projects. http://www.recindia.gov.in/download/int_rates_21_09_04.pdf
13.	Financial Benchmark	10.25%	Reserve Bank of India, Annual report 2005-2006 (http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf).

The benchmark chosen for analysis is fully consistent with the choice of approach. We believe the CDM-PDD contains clear and transparent arguments to demonstrate how the parameters were derived.

Benchmark prime lending rate for public sector banks as of December 2005 (when IRR calculations were made and reported in Table 4 below): 10.25-11.25% (Source: Reserve Bank of India, Annual Report 2005-06, Table 1.58: Movements in Deposit and Lending Rates. http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf).

"Table 11.1: Cash Reserve Ratio and Interest Rates: 2005-06" of the same report indicates a PLR range of 10.25 – 10.75%, considering five major banks.

Thus, a benchmark IRR of 10.25% has been chosen as conservative.

Sub-step 2c. Calculation and comparison of financial indicators

The IRR of the project is 7.6%, far below the benchmark IRR. The economic analysis is shown in Table 4.

Table 4: IRR calculation for Nimoo Bazgo Project

All values in Crore (10^7) Rupees, except for Generation and Sales Rate

	OUTFLOW				INFLOW			
Year	INR	0&M	W/C	Total	Generation GWh	Sales Rate Rs./kWh	Sales	Net Revenue
1	107.38			107.38				-107.38
2	127.14			127.14				-127.14
3	211.88			211.88				-211.88
4	142.26			142.26				-142.26
5		9.17	1.80	10.97	236.94	2.71	64.23	53.26
6		9.17	1.80	10.97	236.94	2.71	64.23	53.26
7		9.17	1.80	10.97	236.94	2.71	64.23	53.26
8		9.17	1.80	10.97	236.94	2.71	64.23	53.26
9		9.17	1.80	10.97	236.94	2.71	64.23	53.26
10		9.17	1.80	10.97	236.94	2.71	64.23	53.26
11		9.17	1.80	10.97	236.94	2.71	64.23	53.26
12		9.17	1.80	10.97	236.94	2.71	64.23	53.26
13		9.17	1.80	10.97	236.94	2.71	64.23	53.26
14		9.17	1.80	10.97	236.94	2.71	64.23	53.26
15		9.17	1.80	10.97	236.94	2.71	64.23	53.26
16		9.17	1.80	10.97	236.94	2.71	64.23	53.26
17		9.17	1.80	10.97	236.94	2.71	64.23	53.26
18		9.17	1.80	10.97	236.94	2.71	64.23	53.26
19		9.17	1.80	10.97	236.94	2.71	64.23	53.26
20		9.17	1.80	10.97	236.94	2.71	64.23	53.26
21		9.17	1.80	10.97	236.94	2.71	64.23	53.26
22		9.17	1.80	10.97	236.94	2.71	64.23	53.26
23		9.17	1.80	10.97	236.94	2.71	64.23	53.26
24		9.17	1.80	10.97	236.94	2.71	64.23	53.26
25		9.17	1.80	10.97	236.94	2.71	64.23	53.26
26		9.17	1.80	10.97	236.94	2.71	64.23	53.26
27		9.17	1.80	10.97	236.94	2.71	64.23	53.26
28		9.17	1.80	10.97	236.94	2.71	64.23	53.26
29		9.17	1.80	10.97	236.94	2.71	64.23	53.26
30		9.17	1.80	10.97	236.94	2.71	64.23	53.26
31		9.17	1.80	10.97	236.94	2.71	64.23	53.26
32		9.17	1.80	10.97	236.94	2.71	64.23	53.26
33		9.17	1.80	10.97	236.94	2.71	64.23	53.26
34		9.17	1.80	10.97	236.94	2.71	64.23	53.26
35		9.17	1.80	10.97	236.94	2.71	64.23	53.26
36		9.17	1.80	10.97	236.94	2.71	64.23	53.26
37		9.17	1.80	10.97	236.94	2.71	64.23	53.26
38		9.17	1.80	10.97	236.94	2.71	64.23	53.26
39	-61.10	9.17	1.80	-50.13	236.94	2.71	64.23	114.36

Internal rate of return **7.60%**

Sub-step 2d. Sensitivity analysis

The factors that are likely to have an impact in the IRR calculation are:

- The cost of the project (investment) could be higher due to unforeseen delays in commissioning. It is unlikely to fall, so only increases of 5% and 10% are considered.
- Electricity sales (revenues) could be higher or lower due to changes in electricity sales rate. Increases and decreases of 5% and 10% in electricity sales rate are considered.
- Electricity sales (revenues) could also be higher or lower due to changes in power generation as a result of changes in water availability and/or equipment availability. Increases and decreases of 5% and 10% are considered.

Table 5 shows how variations in those key factors affect the IRR of the project activity. Changes that would reduce project economics are shown in red, while those that would improve project economics are shown in green.

Table 5: Sensitivity analysis for Nimoo Bazgo Hydroelectric Project

Factor					
Project investment change:	**+10%**	**+5%**	**0%**	**-5%**	**-10%**
Project IRR, %	6.83	7.20	7.60		
Change in electricity sales rate:	**+10%**	**+5%**	**0%**	**-5%**	**-10%**
Project IRR, %	8.59	8.10	7.60	7.10	6.57
Change in electricity generation:	**+10%**	**+5%**	**0%**	**-5%**	**-10%**
Project IRR, %	8.59	8.10	7.60	7.10	6.57
O&M change:	**+20%**	**+10%**	**0%**	**-10%**	**-20%**
Project IRR, %	7.32	7.46	7.60	7.75	7.89

The sensitivity analysis shows that, within the range of variability considered, project economics is most sensitive to changes in revenue. However, even with a 10% increase in revenue, the IRR only rises to 8.59% far below the benchmark IRR. If capital cost were 25% lower, or if electricity sales rate were 28% higher, IRR would increase to 10.25%, the benchmark value. Even if O&M costs fell to zero, the IRR would only increase to 8.99%. This confirms that the project continues to be not economically attractive without CDM benefits, except in the case of a substantial increase in the electricity sales rate. Since the electricity sales rate is determined by an government agreement at the time of power plant planning stage, and not by market forces, a large increase such as 28% is unlikely in the Indian context. Therefore, the financial unattractiveness of the project is robust to reasonable variations in the critical parameters.

Step 3 (Barrier analysis) is not used to show additionality for this project

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

The prevailing practice in Indian power investment scene is investing only in medium or large scale conventional power projects, as the projects that are arising are mostly large scale fossil

fuel-based power generation stations. This is mainly due to a better return on investment, economies of scale and easy availability of finances and fuel resources.

While hydroelectric power generation is one of the earliest forms for generating electricity, all regions of the world with hydroelectric potential have built hydro power plants and the technology is well understood, the costs of power generation at individual sites can vary widely, given that the power generation potential depends on available stream flow and head (pressure difference) and these are highly site dependent. The investment requirements can also vary substantially in some cases. This plant has a high investment requirement because the power plant is situated in a high altitude remote area (Ladakh) where temperatures drop below -35 degrees Celsius in winter, the atmospheric pressure is low (because of the high altitude) and accessibility is poor due to road blockages. As a result, the performance efficiency of men and machines in the area is low and the project costs and risks are high.

The hydrological circumstances together with the high investment requirements reduces the return on investment for this power plant to very low levels, as is documented (above) in the PDD, and is the basis for the determination of additionality.

To justify that establishing hydroelectric power project of similar capacities is not a common practice either in the state or the region three approaches have been used:

Approach 1: Contribution of hydroelectric power plants with capacity less than 50 MW in terms of energy generated (GWh) as compared to the net electricity generation (GWh) in both Jammu & Kashmir state and Northern Region grid of India.

The power generation through renewable energy sources is not common which is evident from the fact that the share of renewable energy generation is only around 4.2%. The energy generation from hydro projects with installed capacity below 50 MW represents only 1.6% of the total generation in Jammu and Kashmir State (where the project is located) as shown in Table 6, and only 0.8% of total generation of the Northern Grid, as shown in Table 7. This confirms that hydro projects such as the proposed project activity are not common practice in the region.

Table 6. Net Generation (hydro below 50 MW and total) for Jammu and Kashmir State, for period 2000-2005 Source: Table 3.3 in Annex 3, based on official data

Average total grid generation during period	30,351	GWh
Average hydro<50MW generation during period	494	GWh
Percentage of hydro<50MW generation over total	1.6%	

Table 7. Net Generation (hydro below 50 MW and total) for Northern Region Grid, for period 2000-2005 Source: Table 3.3 in Annex 3, based on official data

Average total grid generation during period	147,615	GWh
Average hydro<50MW generation during period	1,109	GWh
Percentage of hydro<50MW generation over total	0.8%	

Approach 2: Contribution of hydroelectric power plants with capacity less than 50 MW in terms of installed capacity (MW) as compared to the total installed capacity (MW) in both Jammu & Kashmir state and Northern Region grid of India.

There are six power plants in the state of Jammu & Kashmir with capacity below 50 MW. Most of these power plants were commissioned decades earlier, and only the three units of Chenani III and the three units of Sewa III were commissioned in the last decade. These 6 units add up to a total installed capacity of 16.5 MW, out of a total installed capacity of 1649.15 MW for Jammu & Kashmir, i.e. only 1 % of the total.

Similarly for Northern Region grid there are 21 plants below 50 MW. There are only three units of Chenani III, three units of Sewa III and 2 units of Ghanvi that were commissioned in the last decade. These 8 units add up to a total installed capacity of 39 MW, out of a total installed capacity of 32953 MW for the Northern Region grid, i.e. only 0.1% of the total.

The details of the plants are provided in Annex 3 of the PDD.

Approach 3: Comparing the project activity to "similar" projects (assuming a capacity range of ± 50%, i.e. 20 - 70 MW) in the state of Jammu & Kashmir and the Northern Region grid of India.

Hydro projects in the capacity range of 20 – 70 MW in the state of Jammu & Kashmir can be found in Table 3.3 in Annex 3 to the PDD. It can be seen from the data that there was only one power plant (Chenani) within the capacity range. Only three of the units were commissioned in the last decade with an installed capacity of 7.5 MW.

Most of the projects in the entire Northern Region were commissioned long ago, during the period 1955 to 1989. Besides the three Chenani units already discussed above, only two units of Ghanvi were commissioned in the last decade. These units add up to only 30 MW capacity, out of a total installed capacity of 32953 MW in the Northern Region i.e., 0.09% of the total.

So, based on the above mentioned arguments and the results of the three approaches used it can thus be concluded that this type of project activity is not a common practice in the state of Jammu & Kashmir as well as the entire Northern Region of India.

In conclusion, the project activity is not a common practice in the state or the region.

Sub-step 4b. Discuss any similar options that are occurring:

There are very few hydro projects below 50 MW within the State of Jammu and Kashmir. All except one of these are substantially smaller, below 15 MW.

As all steps are successfully completed, therefore the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The project activity involves the generation of electricity through the construction of a hydroelectric plant. Methodology ACM0002 (version 6) is applied to the proposed project. The

project activity mainly reduces carbon dioxide emissions by displacing other generation sources connected to the electricity grid.

The electrical transmission in India is divided in five regions: Northern Region, North-Eastern Region, Eastern Region, Southern Region and Western Region. The Northern Region comprises Delhi, Punjab, Haryana, Chandigarh, Rajasthan, Jammu and Kashmir, Uttaranchal, Uttar Pradesh and Himachal Pradesh.

Baseline emissions are the product of carbon dioxide grid emission factor for the Northern Region of India (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh), as follows:

$$BE_y = (EG_y - EG_{baseline}) \times EF_y \quad (1)$$

As this project is a new plant, it does not involve any retrofit, so $EG_{baseline}$ shall not be calculated. As a consequence, equation (1) is:

$$BE_y = EG_y \times EF \quad (1a)$$

The emissions factor EF is determined from two components: an Operating Margin (OM) and a Build Margin (BM). In each case there are alternative procedures specified in ACM0002.

The Simple Operating Margin is applicable for OM, when low-cost/must-run constitute less than 50% of the total grid generation, which is the case here.

According to ACM0002 (version 6) it is necessary to choose a calculation criteria for the Simple OM used to calculate the Combined Margin (CM). The options for data vintages are:

- *(ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,*
- *The year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex-post monitoring.*

The first option is chosen for the proposed project activity. Thus the value of OM will remain fixed during the first crediting period.

The two options that ACM0002 (version 6) provides to calculate the Build Margin (BM) are:

- *Option 1: calculate the BM emission factor ($EF_{BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options, the sample group that comprises the larger annual generation.*
- *Option 2: for the first crediting period, the BM emission factor ($EF_{BM,y}$) must be updated annually ex-post for the year in which annual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should*

be calculated ex-ante, as described in option 1 above. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

The project participant chooses Option 1 to conduct the BM calculation. This value of BM will remain fixed throughout the first crediting period.

According to ACM0002 (version 6), neither project emissions nor leakage effects are to be considered in the emission reductions calculation. Therefore, baseline emissions are equal to emission reductions.

$$ER_y = BE_y (tCO_2 / yr)$$

Where,

ER_y = Emission reductions during year y in tonnes of CO_2 per year.
BE_y = Baseline emissions during year y in tonnes of CO_2 per year.

Basing on equation (1a), baseline emissions are equal to:

$$BE_y = EG_y \times EF$$

Where,
BE_y = Baseline emissions corresponding to equivalent energy generation from the grid during year y (tCO_2/year)
EG_y = Electricity generated by the project activity and displaced from the grid during year y (MWh)
EF = CO_2 emission factor for the electricity grid (tCO_2/MWh)

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

Data / Parameter:	***EF***
Data unit:	tCO_2/MWh
Description:	Carbon dioxide emission factor of the Northern Region electricity grid
Source of data used:	Calculated from official data sources (see Annex 3)
Value applied:	0.793 for *ex-ante* estimate of emission reductions
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to ACM0002, ver. 6.
Any comment:	Emissions factor calculation is shown in Annex 3. EF will remain fixed throughout the first crediting period.

B.6.3 Ex-ante calculation of emission reductions:

According to ACM0002 (version 6), no leakage emissions are to be considered. Project emissions are not envisaged for the proposed project activity, so emission reductions are equal to baseline emissions.

Estimation of Baseline Emissions

Equation (1a) is used to calculate baseline emissions:

$$BE_y = EG_y \times EF$$

Where,

BE_y = Baseline emissions corresponding to equivalent energy generation from the grid during year y (tCO_2/year)

EG_y = Electricity generated by the project activity and displaced from the grid during year y (MWh)

EF = CO_2 emission factor for the electricity grid (tCO_2/MWh)

The estimated electricity generation by the proposed project activity for the chosen crediting period is:

Table 8: Estimated electricity generation

Year	Estimated Electricity Generation (MWh)
August 2010- July 2011	236,940
August 2011- July 2012	236,940
August 2012- July 2013	236,940
August 2013- July 2014	236,940
August 2014- July 2015	236,940
August 2015- July 2016	236,940
August 2016- July 2017	236,940
Total	**1,658,580**

Estimation of Emission Reductions

As indicated above, emission reductions are equal to baseline emissions. Then,

$$ER_y = EG_y \times EF$$

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

The *ex-ante* emission reductions are estimated to be 187,893 tonnes of CO_2 equivalent per year. However, actual emission reductions will be based on monitored data, thus, *ex-post* emission reductions are likely to be different from the *ex-ante* estimate.

Table 9: Estimation of overall emission reductions throughout the crediting period

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Aug 2010- July 2011	0	187,893	0	187,893
Aug 2011- July 2012	0	187,893	0	187,893
Aug 2012- July 2013	0	187,893	0	187,893
Aug 2013- July 2014	0	187,893	0	187,893
Aug 2014- July 2015	0	187,893	0	187,893
Aug 2015- July 2016	0	187,893	0	187,893
Aug 2016- July 2017	0	187,893	0	187,893
Total	**0**	**1,315,254**	**0**	**1,315,254**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	***EG_y***
Data unit:	MWh
Description:	Net electricity generation by the project activity and displaced from the grid.
Source of data to be used:	NHPC
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	1,658,580 MWh for *ex-ante* estimate of emission reductions was used. This is the estimated generation for the 7-year crediting period (see table 6).
Description of measurement methods and procedures to be applied:	This value will be measured at plant site by using energy meters. The monitored values will be stored in non-volatile memory. These meters are integrated type with storage of data. For monitoring of the generation and transmission of power, a metering system using digital meters and recorders shall be provided for generators, for all lines and feeders of Switchyard, Unit transformers, Station Service Transformers, Step Down transformer etc. All parameters such as voltage, current, power, energy, etc., shall be measured. All the energy meters used for measurements shall have an accuracy of 0.2%. All CT's and PT's shall be provided with a measuring core of accuracy class of 0.2. A system of main meter and check meters both for interface tariff and energy audit shall be provided. Additional information is provided in section B.7.2.

QA/QC procedures to be applied	Since the metering is done at a number of pf points, the method of measurement of power generation is free from errors as several points of check and counter check are available.
Any comment:	Monitored data will be kept for two years after the end of each crediting period or the last issuance of CERs, whichever occurs later.

Data / Parameter:	***Surface area of reservoir***
Data unit:	m^2
Description:	Surface area of reservoir at full reservoir level
Source of data to be used:	NHPC
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	Not applicable
Description of measurement methods and procedures to be applied:	Topographic measurements (surveying) when reservoir has filled to full capacity
QA/QC procedures to be applied	Not applicable
Any comment:	A single measurement at the start of the project

B.7.2 Description of the monitoring plan:

The monitoring of baseline emissions implies the application of an operational and management procedure that shall assure the correct and proper measurement and control of all variables involved in the calculation of emission reductions.

The necessary structure is characterised in the table given below.

Table 10: Operational and management structure

Department	Responsibility	Monitoring	Methodology
Nimoo Bazgo H.E. Project	Head of the Project	Net Electricity Generation *(EG_y)*	Energy meters are provided to measure Power Generation. These are: 1. Main Meter for tariff – provided at line terminal. Accuracy of CT, PT, Energy meter 0.2% 2. Check Meter for tariff - provided at line terminal. Accuracy of CT, PT, Energy meter 0.2% 3. Stand-by meter for tariff – provided on HV side of Generator transformer. Accuracy of CT, PT, Energy meter 0.2% The meters are integrated in nature and as per the latest technology and shall provide the following information stored in non-volatile memory:

			♦ Average frequency for each 15-minutes block (integrated for each 0.02 Hz in linear step). ♦ Net active energy (Wh) for each 15-minutes block with sign (+/-). ♦ Cumulative active energy (Wh) at each mid-night. ♦ Cumulative reactive energy (VARh) each 15-minutes block for low voltage (below 97%) condition. ♦ Meter data storing capacity is 10 days. Meters for energy accounting & audit- provided at HV&LV sides of Unit auxiliary transformer & Station auxiliary transformer. Accuracy of CT, PT, Energy meter 0.2%.
CDM Cell, NHPC Ltd.	Chief Engineer (CDM)	Follow-up of CDM Project	There will be a person in charge of following the development of the project activity.

Monitoring activities that complement the Maintenance Plan (see section A.4.3):

Monitoring tests like Partial Discharge of generators, Dissolved Gas Analysis of Transformer oil, Insulation Resistance, capacitance, tan delta tests[6], and many others are also done to complement the monitoring. Procedures for regular testing and calibration of gauges, panel relays, relays, meters and other instruments are also defined to ensure proper working. The frequency for calibration and other tests are defined as per need following national standards and rules.

Staff Training that complements the Monitoring Plan and Maintenance Plan:

Staff training for proficiency in use of the monitoring instruments is taken care of by the power station management. The HRD cell also conducts training regularly to enhance the skills of personnel attached with such equipment in the operating stations.

The EPC contract includes the supply of the operation and maintenance manuals by the contractor with drawings of the facilities as built. This shall be in such detail as to enable NHPC to operate, maintain, adjust and repair all parts of the facility.

For Nimoo Bazgo specific plans and documents will be available at the time of commissioning of the plant.

Data and Information Management of the plant:

A system shall be provided at central control room that shall be equipped with storage media for real time data storage. The data logger shall be provided to receive, update, print out and show on the VDU's all signals, events, alarms, status, status change, abnormalities and history data of plant and ambient conditions either periodically, on request or immediately in case of alarm.

[6] Tan Delta testing enables the cable test engineer to detect insulation defects.

Redundant Network Attached Storage (NAS) systems of high performance and high capacity to store the plant history data up to the power plant's lifetime shall be provided. The information stored by these storage appliances shall also be available on-line with automatic "hot" backup of on-line data and ready to be shared by servers on the Central Control Room Network and associated LAN. The NAS devices shall have open system architecture to connect them to other equipments. This centralized data storage system shall also use fast read/write optical backup medium such as re-writable CD-RW media using CD writers or high performance tape drives. Storage media is provided for 20 years of storage.

Database Management System based on latest available version of ORACLE RDBMS database software shall be provided.

High reliability of communication shall be realized by double bus (redundant) system. The two systems shall continuously operate separately and only in case of traffic interruption on one bus, the other shall take over the traffic.

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

Date of completion of the baseline study: 27/06/2007. Version 11: 31/03/2009.

Baseline and monitoring study prepared by

Florencia Clavin, Gautam Dutt, and Amit Anand, MGM International Ltda. (Not project participants) (Note: Florencia Clavin is no longer with MGM International.)

Tel: +54-11-5219-1230

e-mail: gdutt@mgminter.com; amitanand@mgminter.com

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:

23-09-2006 (Date construction work was awarded to contractor)

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

35 years

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

Renewable crediting period

C.2.1. Renewable crediting period

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

01-August-2010

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The project is consistent with environmental criteria of the Indian Government. An Environmental Impact Assessment (EIA) has been undertaken for the proposed project activity.

A public hearing was conducted to promote the project. As the Chief Engineer said in the meeting, various aspects have been evaluated based on EIA studies and suitable environmental management plans have been formulated.

Many important environmental aspects were studied in the EIA/EMP reports. The Environmental Manager of NHPC said that pollution will be diminished by the project because it will replace other fuels like wood, kerosene and cow dung. The EIA study for the Nimoo-Bazgo Hydroelectric Project was done through the University of Kashmir. The social aspect was also considered in the assessment.

The EIA covered various aspects like land, environment, terrestrial ecology, aquatic ecology, air environment and socio-economic issues. Summarized are some of the important features of EIA report:

- Physiography and Hydrometeorology
- Geology

- Land requirement
- Floristic and Vegetation types
- Terrestrial Fauna
- Aquatic Ecology
- Soil Characteristics
- Air Quality
- Socio-economics

To mitigate the impacts that the project could have on each issue, an Environmental Management Plan (EMP) was designed and included in the EIA.

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

All environmental impacts have been identified and assessed in the EIA (Environmental Impact Assessment). Based on the impacts following Environmental Management Plans have been proposed for implementation:

- **Biodiversity Conservation Plan:** The Plan consists of planting shrubs near the catchments' area, for which a plant nursery will be installed.
- **Catchment Area Treatment (CAT):** A catchment area treatment is crucial in the context of hydropower development as the life of the reservoir depends on catchments' nature. Engineering and biological measures are to be undertaken to check soil erosion, prevent/check siltation of reservoir and to maintain its storage capacity.
- **Fisheries Development:** A Fish Hatchery where juvenile fish can be raised from restocking in the river will be constructed.
- **Health care:** project developer is required to register all migrant labourers and their families and to get them vaccinated against infectious diseases. They also have to be checked for HIV.
- **Energy alternatives:** In order to meet energetic requirements of people, it is proposed that the use of kerosene, LPG and solar energy be popularized by the local authorities.
- **Waste disposal and management:** A part of the total generated waste is expected to be reutilized. For the rest, two dumping sites were identified near the project's area for waste disposal. These will be stabilized by applying engineering and biological measures.
- **Restoration of borrow areas and quarry and construction sites:** refilling of the craters from material extraction will be done with the muck, followed by the landscaping and Plantation (stabilization with vegetation cover). This also includes construction of retaining walls.
- **Reservoir Rim Treatment and Green Belt Creation:** The right bank will need engineering works to stabilize the slope to prevent rock fall. There is an adequate potential for creating a green belt and recreation area on Nimoo Plateau on the left bank and near Bazgo village on the right bank.
- **Resettlement and Rehabilitation:** The project will not involve displacement of any family and houses or any other private structures and the submergence is not involving any forest area. Families are to be compensated so they can continue with agricultural/horticultural activities. Although no family is getting displaced by the activity, it is proposed to develop various infrastructure facilities in the project-affected

villages. This would include extension of educational facilities, provision of drinking water, etc.

- **Solid Waste Management:** the project authorities need to keep the provision for treatment of sewage in all the places. Every colony shall be provided with septic tanks and soak pits and collecting bins.
- **Disaster management plan:** if a natural disaster occurs it is necessary to have an action plan designed to face that situations.
- **Air and Noise pollution Control:** Many measures that mitigate air and noise pollution are applied during construction phase. They are listed in the EMP.
- **Environmental monitoring programme:** biodiversity of the project's area should be inventorised and monitored so as to assess the efficacy of the management plan.

The project will not cause displacement of any family. Detailed socio-economic analysis of the project affected villages has been carried out. Rehabilitation and resettlement plan has been prepared which includes measures like education, health, landless grants, livelihood grants development of infrastructure facilities, vocational training and scholarships, etc.

The public was also requested to make any comment about the project so as to consider them in the EIA/EMP reports.

In addition to the activities of the EMP, various community development works were carried out by the project for welfare of the people living in the region. These include employment to local people in various works, free health check up, free medicine for local people, free medical camps, donation to schools, construction of roads in the area, flood relief and reconstruction of damaged infrastructures in local villages, etc. CDM revenues would help in further strengthening such activities.

Regular interaction with stakeholders is done to monitor, share and resolve the environmental and socio-economic issues. A multi-disciplinary committee meets periodically and takes decisions as needed and monitors progress. The multi-disciplinary committees have been constituted including members of various agencies (NHPC Environmental Wing, Ministry of Environment & Forests, Agriculture Dept., Horticulture Dept, Soil Conservation Dept, Wildlife Dept and NGOs)

SECTION E. Stakeholders' comments

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

A Public Hearing Meeting was convened in compliance with the EIA notification of the Ministry of Environment and Forests, Government of India. The meeting was organized and conducted by Jammu and Kashmir State Pollution Control Board at Village Saspol on December 15th 2004.

The Public Hearing Meeting that was held in village Saspol had as purpose to seek the views of the people about the project and also to seek the suggestions from them for making the project better from environmental angle. The project will play a key role in the development of the area nearby project and entire Ladakh region in improving the socio-economic status of the people.

The public Hearing consisted of several presentations. Specifically, the Chief Engineer of Nimoo Bazgo HE Project described the technical details of the project.

Many important people and general public (over 100 participants) attended the Public Hearing. They all were asked to give their views on the project because they will be useful for a better development of the project. The following dignitaries/prominent people were present at the meeting:

Table 11: Stakeholders involved in the public hearing

Sl. No.	Name	Position and Institution or Company	
1	Mr.S. D. Swatantra	Chairman	J & K State Pollution Control Board
2	Mr.A Razak	Member Secretary	J & K State Pollution Control Board
3	Mr. Murup	Sub-Divisional Magistrate	Government
4	Mr. Takpa	Regional Wildlife Warden	Government
5	Mr.Jagjit Singh Ishar	Divisional Forest Officer, Leh	Governemnt
6	Mr.Saleem-ul-Haq	District Wildlife Warden J&K	Governemnt
7	Mr.Tsewang Paljor	Sarpanch - Alchi	Village level head
8	Mr.Lobzang Nurboo	Sarpanch- Saspol	Village level head
9	Mr.Tsewang Morup	Sarpanch - Bazgo	Village level head
10	Mr. T. Samphel	Ex Member Legislative Assembly	
11	Mr. Tundup Sonam	President	Ladakh Buddhist Association
12	Mr.Sonam Dorje		
13	Mr.Narboo Gyalson	Executive Councilor Works	Ladakh Autonomous Hill Development Council
14	Mr.Rinchen	Councilor Saspol	Ladakh Autonomous Hill Development Council
15	Mr.Y. R. Pahuja	Chief Engineer Nimoo Bazgo Hydroelectric Project	National Hydroelectric Power Corporation Ltd.
16	Mr.K. K. Shrivastava	Senior Manager (Civil) Nomoo Bazgo Hydroelectric Project	National Hydroelectric Power Corporation Ltd.
17	Dr. Shahid Ali Khan	Manager (Environment)	National Hydroelectric Power Corporation Ltd.
18	Mr Malkiat Singh	DM	
19	Mr. S. P. Puri	DM	
20	List of Local Participants enclosed as Annex 5		

E.2. Summary of the comments received:

All comments were favourable to project development. All people are in favour of project construction. All people stressed the environmental responsibility that NHPC has.

Moreover, some people requested NHPC to take into consideration the following main suggestions:

- To protect the hot spring under the submergence, relocate the foot-bridge near Bazgo village and to involve Ladakhis in project construction. Health care, education and training were also emphasized.

- Proper arrangements for maintenance and uninterrupted water supply for irrigation were required.
- Compensation to the project affected families involving suitable land rates are to be adopted.
- Suitable measures should be taken to protect horticultural land, apricot and apple farming in the area.

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

EIA & EMP reports along with public hearing report were submitted to Ministry of Environment & Forest, New Delhi. The same was discussed by environmental appraisal Committee of MoEF. Based on the recommendations of expert committee, the project was accorded environment clearance by MoEF. All the conditions stipulated in the environmental clearance letter would be complied with. Suggestions received from the people will be considered and will be given due care.

Suggestions received from the people will be considered and will be given due care. The Environmental Manager of NHPC at Nimoo Bazgo in reply to the queries of the people detailed the measures to be taken. The project will construct separate colonies for residential purpose of labours and staff and will not affect the local villagers. A biodiversity conservation plan will also be implemented for conservation of important flora and fauna (it includes a fishery development plan). Medical facilities will also be provided to the project affected people.

Regarding rates for compensation of private land, it was intimated that NHPC is always guided by the guidelines and norms of Government of India. The foot-bridge across the river Indus near Bazgo village, which is coming under submergence will be raised or relocated. The project regarding the hot spring raised by the villagers will be looked into.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	National Hydroelectric Power Corporation Ltd.
Street/P.O.Box:	Sector -33
Building:	NHPC Office Complex
City:	Faridabad
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Represented by:	
Title:	Executive Director (R&D)
Salutation:	Mr.
Last Name:	Chandra
Middle Name:	
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Department:	Research & Development
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No funds from multilateral or bilateral development assistance would be used for any aspect of the proposed project activity.

Annex 3

BASELINE INFORMATION

Key data used to estimate the *ex-ante* baseline scenario emissions are given in Table 3.1.

Table 3.1: Key data

Parameters	Value	Data sources
Combined margin emission factor used for *ex-ante* estimation of ER	0.793 tCO_2/MWh	CEA Database
Variables	**Value**	**Data sources**
Electricity generation of the industrial facility	1,658,580 MWh	NHPC (Project developer)

Calculation of grid emission factor (*EF_y*) for Northern Region in India

The Central Electricity Authority (CEA) of India is a statutory organization constituted under Section 3 of the repealed Electricity (Supply) Act, 1948. It was established as a part-time body in the year 1951 and made a full-time body in the year 1975.

As per section 73 of the Electricity Act, 2003, the Central Electricity Authority shall perform certain functions and duties. These functions and duties can be seen in: http://www.cea.nic.in/about_us/functions_cea.html

There is a specific section in their website[7] where the calculation of the grid emission factor is publicly available. They also provide a *User's guide* for the *CO_2 Baseline Database for the Indian Power Sector*.

According to the *User's guide:*

- *The Baseline Carbon Dioxide Emissions from Power Sector have been worked out by CEA based on detailed authenticated information obtained from all the operating Power Stations in the country. The Baseline would benefit all prospective CDM project developers to estimate the amount of Certified Emission Reduction (CERs) from any CDM project activity.*

- *The Indian electricity system is divided into five regional grids, viz. Northern, Eastern, Western, Southern, and North-Eastern. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighbouring countries like Bhutan and Nepal. For each of the five regions, the main emission factors are calculated in accordance with the relevant CDM methodologies.*

For specific assumptions in the calculation please refer to the *User's guide*.

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

The calculation made by CEA is done using ACM0002 version 6, considering data up to fiscal year 2005-06. For calculation of Operating Margin the Simple Method is applied.

The steps followed to calculate the combined margin are synthesized below.

STEP 1: Calculate the Operating Margin emission factor ($EF_{OM,y}$)

The following table shows that LCMR constitute less than 50% of the total grid generation. This is to justify the applicability of the Simple Operating Margin in the Northern Region.

Table 3.2: Share of LCMR resources
(Source: CEA Database)

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	**25.9%**	**25.7%**	**26.1%**	**28.1%**	**26.8%**	**28.1%**
East	10.8%	13.4%	7.5%	10.3%	10.5%	7.2%
South	28.1%	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.2%	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	42.3%	42.1%	45.8%	41.8%	55.4%	52.7%
India	19.2%	18.9%	16.3%	17.1%	18.0%	20.1%

Therefore, following option (a) Simple Method, the $EF_{OM,y}$ is given by:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (1)$$

Where,

$F_{i,j,y}$	=	Amount of fuel *i* (in a mass or volume unit) consumed by the relevant power sources *j* in the year *y*
j	=	Power sources delivering electricity to the grid, not including LCMR and including imports to the grid
$COEF_{i,j,y}$	=	Is the CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year *y*
$GEN_{j,y}$	=	Is the electricity (MWh) delivered to the grid by source *j*

The following tables show the generation of the plants connected to the Northern Region of India for each Fiscal Year.

Table 3.3: Net generation of the plants connected to the Northern Region (GWh)

(Source: CEA Database)

S_NO	NAME	CAPACITY MW AS ON 31/03/2005	STATE	TYPE	FUEL 1	FUEL 2	2000-01 Net Generation GWh	2001-02 Net Generation GWh	2002-03 Net Generation GWh	2003-04 Net Generation GWh	2004-05 Net Generation GWh	2005-06 Net Generation GWh
1	BADARPUR	720	DELHI	THERMAL	COAL	OIL	4742	4806	4811	4943	4919	4866
2	I.P.STATION	247,5	DELHI	THERMAL	COAL	OIL	766	711	547	669	806	838
3	RAJGHAT	135	DELHI	THERMAL	COAL	OIL	698	608	739	683	607	495
4	I.P.GT	282	DELHI	THERMAL	GAS	n/a	1113	1148	1187	1189	1503	1697
5	PRAGATI CCGT	330,4	DELHI	THERMAL	GAS	n/a			813	2345	2493	2227
6	F_BAD EXTN.	180	HARYANA	THERMAL	COAL	OIL	716	700	850	689	755	696
7	PANIPAT	1360	HARYANA	THERMAL	COAL	OIL	2416	4184	4486	5350	5137	7330
8	F_BAD CCGT	430	HARYANA	THERMAL	GAS	NAPT	2256	2797	2645	2727	3100	2885
9	GNDTP(BHATINDA)	440	PUNJAB	THERMAL	COAL	OIL	2524	2501	2266	2308	1749	2071
10	GHTP (LEH.MOH.)	420	PUNJAB	THERMAL	COAL	OIL	2940	2794	2646	3079	2998	2864
11	ROPAR	1260	PUNJAB	THERMAL	COAL	OIL	7751	8151	7565	7612	8304	8535
12	KOTA	1045	RAJASTHAN	THERMAL	COAL	OIL	5828	5738	5915	5792	6712	7525
13	N.A.P.S	440	UTTAR PRADESH	NUCLEAR	NUCLEAR		2735	3008	3222	2692	2441	1864
14	R.A.P.S.	740	RAJASTHAN	NUCLEAR	NUCLEAR		3326	4243	4509	3800	3815	3969
15	SURATGARH	1250	RAJASTHAN	THERMAL	COAL	OIL	2927	3725	6490	7419	8492	9041
16	RAMGARH GT	113,8	RAJASTHAN	THERMAL	GAS	DISL	227	116	210	206	336	404
17	ANTA GT	413	RAJASTHAN	THERMAL	GAS	NAPT	2809	2986	2679	2702	2710	2739
18	OBRA-A	1550	UTTAR PRADESH	THERMAL	COAL	OIL	5230	5018	5786	5509	4891	4733
19	PANKI	252	UTTAR PRADESH	THERMAL	COAL	OIL	759	845	937	985	938	864
20	H_GANJ B	450	UTTAR PRADESH	THERMAL	COAL	OIL	584	562	652	615	542	432
21	PARICHA	220	UTTAR PRADESH	THERMAL	COAL	OIL	464	839	765	523	800	679
22	ANPARA	1630	UTTAR PRADESH	THERMAL	COAL	OIL	10522	11136	10690	10997	10524	10547
23	SINGRAULI STPS	2000	UTTAR PRADESH	THERMAL	COAL	OIL	15323	14438	14769	14479	14696	10401
24	RIHAND	1500	UTTAR PRADESH	THERMAL	COAL	OIL	7126	7077	7128	7347	7351	9866
25	UNCHAHAR	840	UTTAR PRADESH	THERMAL	COAL	OIL	4922	5987	5626	5868	6200	6451
26	DADRI (NCTPP)	840	UTTAR PRADESH	THERMAL	COAL	OIL	6406	6151	5555	5683	6329	6268

27	TANDA	440	UTTAR PRADESH	THERMAL	COAL	OIL	1084	1933	1921	2650	2923	2935
28	AURAIYA GT	652	UTTAR PRADESH	THERMAL	GAS	NAPT	4545	4543	4140	4122	3994	4204
29	DADRI GT	817	UTTAR PRADESH	THERMAL	GAS	DISL	5507	5583	5068	4930	5319	5269
30	PAMPORE GT	175	JAMMU & KASHMIR	THERMAL	GAS	n/a	5	0	56	28	23	9
31	BHAKRA	1325,00	BBMB	HYDRO			4669	4170	5267	5746	3361	5693
32	GANGUWAL	77,65	BBMB	HYDRO			524	631	612	589	960	578
33	KOTLA	77,65	BBMB	HYDRO			524	631	612	589		488
34	DEHAR	990	BBMB	HYDRO			3146	3042	3322	3283	3135	3107
35	PONG	396	BBMB	HYDRO			1508	1415	804	1179	880	1722
36	BAIRA SIUL	198	HIMACHAL	HYDRO			646	603	677	685	686	787
37	SALAL I & II	690	JAMMU & KASHMIR	HYDRO			2924	2915	3123	3461	3428	3463
38	TANAKPUR	94,2	UTTARANCHAL	HYDRO			433	410	425	509	494	481
39	CHAMERA-I	540	HIMACHAL	HYDRO			2101	1946	2247	2452	2093	2326
40	CHAMERA II	300	HIMACHAL	HYDRO			0	0	0	181	1340	1483
41	URI	480	JAMMU & KASHMIR	HYDRO			1772	2077	2451	2858	2196	2711
42	NATHPA JHAKRI	1500	HIMACHAL	HYDRO			0	0	0	1115	5084	4033
43	WY.CANAL A -D	62,4	HARYANA	HYDRO			243	231	243	255	290	258
44	SANJAY BHABA	120	HIMACHAL	HYDRO			499	480	577	578	580	571
45	BASSI	60	HIMACHAL	HYDRO			261	257	280	313	269	258
46	GIRI BATA	60	HIMACHAL	HYDRO			204	191	167	168	155	192
47	GHANVI	22,5	HIMACHAL	HYDRO			14	40	81	73	74	69
48	ANDHRA	16,95	HIMACHAL	HYDRO			44	60	72	69	52	62
49	BANER	12	HIMACHAL	HYDRO			39	31	37	40	42	43
50	GAJ	10,5	HIMACHAL	HYDRO			49	37	40	48	51	51
51	BINWA	6	HIMACHAL	HYDRO			34	21	25	34	33	33
52	THIROT	4,5	HIMACHAL	HYDRO			16	25	33	31	11	4
53	MALANA	86	HIMACHAL	HYDRO			0	186	331	340	268	336
54	BASPA	300	HIMACHAL	HYDRO			0	0	0	1106	1148	1161
55	LOWER JHELUM	105	JAMMU & KASHMIR	HYDRO			341	311	4	504	427	494
56	UPPER SINDH I& II	127,6	JAMMU & KASHMIR	HYDRO			114	156	232	274	177	213

57	GANDHARBAL	15	JAMMU & KASHMIR	HYDRO			16	30	17	24	29	31
58	MOHARA	9	JAMMU & KASHMIR	HYDRO			1	0	2	0	1	1
59	CHENANI I&III	30,8	JAMMU & KASHMIR	HYDRO			81	39	58	71	78	16
60	KARGIL	3,75	JAMMU & KASHMIR	HYDRO			0	0	9	4	9	6
61	STAKNA	4	JAMMU & KASHMIR	HYDRO			3	2	0	0	0	2
62	SEWA-III	9	JAMMU & KASHMIR	HYDRO			0	0	0	10	10	12
63	SHANAN	110	PUNJAB	HYDRO			487	470	475	560	514	506
64	U.B.D.C. ST.-I& II	91,35	PUNJAB	HYDRO			343	299	388	425	378	529
65	MUKERIAN I -IV	207	PUNJAB	HYDRO			1216	1165	743	1024	807	1233
66	ANANDPUR SAHIB ST-I&II	134	PUNJAB	HYDRO			649	536	738	816	499	718
67	RANJIT SAGAR	600	PUNJAB	HYDRO			431	1223	1154	1541	1139	2003
68	R.P.SAGAR	172	RAJASTHAN	HYDRO			182	258	14	239	374	313
69	J.SAGAR	99	RAJASTHAN	HYDRO			139	199	13	203	281	227
70	MAHI BAJAJ I&II	140	RAJASTHAN	HYDRO			36	69	20	198	277	217
71	ANOOPGARH ST I&II	9	RAJASTHAN	HYDRO			13	9	5	0	0	2
72	RMC MANGROL	6	RAJASTHAN	HYDRO			3	4	1	0	0	0
73	SURAT GARH	4	RAJASTHAN	HYDRO			1	1	0	0	0	0
74	RIHAND	300	UTTAR PRADESH	HYDRO			1043	1036	616	1104	479	544
75	OBRA	99	UTTAR PRADESH	HYDRO			412	389	253	434	200	230
76	MATATILLA	30,6	UTTAR PRADESH	HYDRO			136	134	102	135	152	143
77	KHARA	72	UTTAR PRADESH	HYDRO			343	307	409	381	281	327
78	NIRGAJANI(Ganga Canal)	5	UTTAR PRADESH	HYDRO			143	20	30	80	53	34
79	CHIBRO (YAMUNA)	240,00	UTTARANCHAL	HYDRO			763	736	869	810	633	801
80	KHODRI	120,00	UTTARANCHAL	HYDRO			367	363	407	386	299	377
81	DHAKRANI	33,75	UTTARANCHAL	HYDRO			142	114	174	159	126	164
82	DHALIPUR	51,00	UTTARANCHAL	HYDRO			219	192	258	230	183	235
83	KULHAL	30,00	UTTARANCHAL	HYDRO			145	123	164	153	128	160
84	MANERI BHALI	90,00	UTTARANCHAL	HYDRO			407	389	455	486	456	453

85	CHILLA	144,00	UTTARANCHAL	HYDRO			516	538	559	685	741	656
86	PATHRI	20,40	UTTARANCHAL	HYDRO			0	108	100	97	100	98
87	MOHAMAD PUR	9,30	UTTARANCHAL	HYDRO			0	25	37	0	31	36
88	RAMGANGA	198,00	UTTARANCHAL	HYDRO			471	273	179	198	211	322
89	KHATIMA	41,40	UTTARANCHAL	HYDRO			165	170	161	172	182	164
90	DHAULI GANGA	280	UTTARANCHAL	HYDRO							0	313

The CO_2 emission coefficient $COEF_i$ is obtained as:

$$COEF_i = NCV_i \times EF_{CO2,i} \times OXID_i \qquad (2)$$

Where,

EF_i — CO_2 emission factor per unit of energy of the fuel *i*
$OXID_i$ — Oxidation factor of the fuel *i*
NCV_i — Net calorific value (energy content) per mass or volume unit of a fuel

Since this PDD determines the emissions factor ex ante, to remain unchanged for the first crediting period, the operating margin emissions factor must be calculated from the generation weighted average for the three most recent years for which data are available. The Operating Margin for the most recent three years, for the Northern Region is shown in Table 3.4.

Table 3.4: Operating Margin for recent years and three-year average(tCO_2/MWh)
(Source: CEA Database)

	2003-04	2004-05	2005-06	Three-year average
North	0.99	0.98	0.99	**0.986**

STEP 2. Calculate the Build Margin emission factor ($EF_{BM,y}$)

It is calculated as the generation-weighted average emission factor (tCO_2/MWh) of a sample of power plants *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (3)$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above described.

The Build Margin for the most recent year of data (2005-06), for the Northern Region is **0.600** tCO_2/MWh. (Source: CEA Database)

STEP 3. Calculate the baseline emission factor (EF_y)

It is the weighted average of the OM emission factor and the BM emission factor:

$$EF_y = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y} \qquad (4)$$

The results are shown below:

Table 3.5: Operating margin, Build margin and combined margin for the Northern Region

tCO_2/MWh

Operating margin	0.986
Build margin	0.600
Combined margin	0.793

In compliance to what is expressed in the previous paragraphs of the User's guide, Nimoo Bazgo Hydroelectric project uses the published emission factor in the CEA website to estimate the baseline emissions.

As Nimoo Bazgo Hydroelectric project is located in the Northern Region then the combined margin emission factor applied in the present project activity is 0.793 tCO_2/MWh.

Annex 4

MONITORING INFORMATION

The Monitoring and Verification Plan describes the procedures followed in order to collect information and auditing required for the project activity development. This plan is necessary to determine and verify emissions reductions achieved by the project activity.

Particularly, this project will require very straightforward collection of data, most of which will be collected by the staff of NHPC where the proposed CDM project is to be implemented.

The Monitoring and Verification Plan (MVP) document fulfills the CDM Executive Board requirements regarding the credibility and accuracy of the monitoring and verification procedures used in CDM projects.

The purpose of these procedures is to manage and support the continuous monitoring process of project performance and periodic auditing, verification and certification activities to determine project outcomes, in particular in terms of greenhouse gas (GHG) emission reductions. The MVP is a vital component of project design and, as such, is subject to a formal third-party validation process —along with the project baseline and other project design features[8].

Managers of the Project must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to successfully develop and maintain the proper set of information to undergo an audit for a greenhouse gas (GHG) emission reductions investment. These records and monitoring systems are needed to subsequently allow an Operational Entity to verify project performance as part of the verification and certification process. In particular, this process reinforces the fact that GHG reductions are real and credible to the buyers of the Certified Emissions Reductions (CERs). This set of information will be needed to meet the evolving international reporting standards developed by the UNFCCC.

These guidelines must be followed by the project activity implementers and operators of NHPC. Strict adherence to the procedures set out in this monitoring plan is necessary for the project managers and operators to successfully measure and track project impacts for audit purposes. MGM International will provide capacity building to the Technical Departments of NHPC in order to meet the requirements presented in this MVP.

The methodology applied to this project describes the procedure and equations to calculate emissions reductions from monitored data. For the specific project, the methodology is applied through spreadsheet models. The staff responsible for Project monitoring must complete the electronic worksheets. The spreadsheets automatically provide annual totals in terms of GHG reductions achieved through the project activity.

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[8] GHG and other environmental related parameters are monitored and recorded.

The models contain a series of worksheets regarding different aspects of emission reductions calculation:

- Data entry sheets (*net energy generation*)
- Calculation sheets (*baseline emissions*)
- Result sheet (*emission reductions*)

There are worksheets where the user is allowed to enter data. Even in these sheets, only those cells where the staff of each plant is required to enter data have been left unblocked. All other cells contain model fixed parameters or computed values that cannot be modified by the staff.

A color-coded key is used to facilitate data input. The key for the code is as follows*:*

- ***Input Fields:*** Pale yellow fields indicate cells where project operators are required to supply data input, as is needed to run the model;
- ***Result Fields:*** Green fields display key result lines as calculated by the model.

The last sheet shows the results, comparing year-by-year GHG emissions with the project with baseline values in order to determine annual emission reductions, shown in the last column.

All electronic data will be backed up on a monthly basis.

Annex -5

List of Local Participants in Public hearing Meeting

List of participants 15/12/0[illegible]

In J&K State Pollution control Board Environmental Public hearing for Nimoo Bazgo HE Project — Saspol.

Sl. No.	Name	Address	Signature
1	Chewang Paljore Sarpanch –	R/o Alchi	
2	Lobzang Norboo Sarpanch	Saspol	
3			
4	Tsewang Morup	Sarpanch Bazgo	
5	Sonam Dorjey	Alchi Lompo	
6	Rinchen Tundup	Councillor Saspol	
7	Sonam [illegible]	[illegible]	
8	Mushtaq Ahmed Patwari	Saspol Circle	
9	Smanla Norboo	Secretary Chhoskhor Bazgo Alchi	
10	Rinchen Stupdan Member Den	Alchi	
11			
12	Rigzen Namgyal	Alchi (Panch)	
13	Tsering Wangchok	Bazgo	
14	Tsering Morup	Bazgo	
15	Tsering Tundup	-do-	
16	Tsewang Norboo	Bazgo	
17	Eshay Tundup	Bazgo	
18	Sonam Dorjey	Chullangcha	

1.	Tsetan Gurmet	Umullang	[signature]
20.	Nawang Goleg	Alchi	[signature]
21.	Tsetan Tashi	Umullang	T'TAS
22	Tsering Stobgyes	Alchi	[signature]
23	Phunchok Angchuk	Alchi	[signature]
24.	Tsering Norboo	Alchi	[signature]
25	Tsering [illegible]	Alchi	[signature]
26	Tashi Dolkar	- do -	[signature]
27	Thinlas Angchok	do -	Thls
28,	Punchok Tsering	do -	[signature]
	Punchok Tsering	Basgo	[signature]
29.	Tsering Dolkar	Saspol	T-Dolkar
30.	Tsering Chorol	Saspol	T.Chord.
31.	Phunchok Dolma	Saspol.	P.Dolma
32	T. Norup	Nimoo	[signature]
33	T. Phunchok	Bazgo	[signature]

1.	Tsewang Morup	Bazgo	[signature]
35.	Rigzin Dorje	Bazgo	[signature]
36.	Tsering [illegible]	Bazgo	[signature]
37.	Tsering Namgyal	Saspol	[signature]
38.	Nawang Tsering.	Saspol.	[signature]
39.	Skalwe Tsering	Saspol.	[signature]
40.	Tashi Angchok	Alchi	[signature]
41.	Sonam Punchok	Alchi	[signature]
42.	Takspa Gyaltson	Alchi	[signature]
43	Sonam Rigzen	Alchi	[signature]
44 —	Tsering Norboo	Alchi	[signature]
45	Tsering [illegible]	[illegible]	[signature]
46	Skarma Sonam	– Skurbuchan	[signature]
47.	Tashi Jolden	– do –	[signature]
48.	Sungay Namgyal	Saspol	[signature]

49.	T. Tashi	[illegible]	[illegible]
50.	D. Dorjey	[illegible]	[illegible]
51.	[illegible]	Saspol	[illegible]
52	Padma Rigzin	Saspol	[illegible]
53.	Tsering Angmo	Saspo	[illegible]
54.	Tsering Tashi	Saspol	[illegible]
55.	Tsewang Rigzin	Alchi	[illegible]
56.	Tsewang Rigzen	Nimoo	[illegible]
57.	Nawang Rigzin	Alchi	[illegible]
58	[illegible]	Saspal	[illegible]
59.	Pundup Sonam	Saspol	[illegible]
60	T. Morup	D.P. Olch	[illegible]
61.	P. Namgial	Saspol	[illegible]
62.	T. [illegible]	Saspol	[illegible]
63.	R. [illegible]	Saspol	[illegible]
64.	T. Dorjay	Saspal	[illegible]

65.	[illegible]	SASPOL	[signature]
66	GURMATI	NIMOO	[signature]
67.	Tsering Dorjey	Saspol	[signature]
68.	Rigzin Namgyal	Saspol.	[signature]
69.	T. Tundup	Saspol.	[signature]
70.	T. Namjor	Saspol	Tamchang
71.	Tsering [illegible]	Nimoo	[signature]
71.	Angdu Dorjey	Saspola	[signature]
72.	Tsi Tundup	Saspol	[signature]
73.	Tsering Namgyal	Nimoo	[signature]
74.	Tsering [illegible]	Nimoo	[signature]
75.	Tsering Angchuk	Nimoo	[signature]
76.	Tundup Tashi	Nimoo	[signature]
77.	Tsering tundup	Nimoo	[signature]
78.	T. Chonjor	Nimoo	[signature]

7?	Tsering [illegible]	Nimoo
~~84~~	Mr. [illegible] Dorje	
80	Padma Dorjay	[illegible]
81.	Tselaw Tashi	Saspochey Morpholtyokan
82	Tashi Gyatso	Saspol
83.	Tsering Norboo	Saspol
84.	Tondup ~~Dorje~~ Tashi	Saspol
85.	Sonam Dorjey.	Saspol.
86.	Golam Raheul	Chuchot.
87	Lobzang Konchok	Nimoo
88	Tsering Namgail	Saspol
89.	Stanzin Norboo	Saspol.
90	Smanla Tondup	Saspol
91.	Tsering Tashi	Bazgo
92.	Lobzang Rinchen	Saspol
93.	Sherab Gyatso	Saspol.

94	Lobzang Chhoring	NIMOO	
95.	Phunchok Namgail	Saspol	
96	Sonam Tundup	"	
97	Tashi Tsewang	"	
98	Tsewang Namgail	"	
99	Tsewang Punchok	"	
100	Dhinchik Tose	--	
101.	S. Morgees	2	
102	Tsewang Rabgais	Saspol	
103	Sonam Norbu	Nimo	