



VALIDATION REPORT

Nimoo - Bazgo Hydroelectric Project in India

REPORT No. 2007-1991

REVISION No. 02



VALIDATION REPORT

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CERTIFICATION AS

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Client: MGM Carbon Portfolio, S.a.r.l	Client ref.: Mrs. Ivana Cepon

Project Name: Nimoo – Bazgo Hydroelectric Project

Country: India

Methodology: ACM0002

Version: 06

GHG reducing Measure/Technology: “Renewable energy power generation”

ER estimate: 187 893 tCO₂ e per year.

Size

☒ Large Scale

☐ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☐ Corrective Actions Requested

☐ Clarifications Requested

☒ Full Approval and submission for registration

☐ Rejected

In summary, it is DNV's opinion that the “*Nimoo – Bazgo Hydroelectric Project*”, India as described in the PDD version 11 of 31 March 2009, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002 version 06. DNV thus requests the registration of the project as a CDM project.

Report No.: 2007-1991	Date of this revision: 31 March 2009	Rev. No. 02
Report title: “ <i>Nimoo – Bazgo Hydroelectric Project in India</i> ”		
Work carried out by: Nikesh R S; Ma Paa Puratchikkanal; Michael Lehmann		
Work verified by: Anjana Sharma.		

Key words:

Climate Change

Kyoto Protocol

Validation

Clean Development Mechanism

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
DPR	Detailed Project Report
DG	Diesel Generator
EIA	Environmental Impact Assessment.
EB	Executive Board
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IRR	Internal Rate of Return
IPCC	Intergovernmental Panel on Climate Change
LOA	Letter of Approval
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
NHPC	National Hydroelectric Power Corporation Limited.
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Aggrement
PLF	Plant Load Factor



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of “Nimoo – Bazgo Hydroelectric Project in India”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party India fulfill the participation criteria and has approved the project and authorized the project participants. The DNA from India confirmed that the project assists in achieving sustainable development /5/.

The project correctly applies ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, version 06.

By generating electricity from hydropower to the grid, displacing electricity generated from fossil fuels, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It has been demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. Adequate training and monitoring procedures have been defined in the project design document. The same will be verified during the verification.

The total emission reductions from the project are estimated to be on the average 187 893 tCO₂/year over the selected 7-year renewable crediting period. The emission reduction forecast has been checked, and it is deemed likely that the stated amount will be achieved given that the underlying assumptions do not change.

In summary, it is DNV’s opinion that the “Nimoo – Bazgo Hydroelectric Project in India”, as described in the PDD of 31 March 2009, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002, version 06. DNV thus requests the registration of the project as a CDM project activity.



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2 INTRODUCTION

The “MGM Carbon Portfolio, S.a.r.l.” has commissioned DNV Certification AS to perform a validation of the “*Nimoo – Bazgo Hydroelectric Project in India*”. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002, version 06. The validation team has, based on the recommendations in the Validation and Verification Manual employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.



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3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table lists the documentation that was reviewed during the initial phase of the validation i.e. desk review:

- /1/ MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 01,
Dated 01 July 2007
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 02 Dated 11 April 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 03 Dated 12 May 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 04 Dated 13 June 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 05 Dated 10 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 06 Dated 14 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 07 Dated 23 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 08 Dated 29 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 09 Dated 30 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 10 Dated 05 August 2008
 - MGM Carbon Portfolio, S.a.r.l , Nimoo – Bazgo Hydroelectric Project Version 11 dated 31 Mar.2009
- /2/ CDM Executive Board: Tool for the demonstration and assessment of additionality, version 04.
- /3/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /4/ ACM0002 version 06 "consolidated baseline methodology for grid connected electricity generation from renewable sources"
- /5/ Letter of Approval from host country India dated 10 August 2007.



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- /6/ Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 12 June 2007.
- /7/ Power Purchase Agreement (PPA) between NHPC and Power development department, Jammu & Kashmir dated 26 October 2005.
- /8/ Construction agreement signed with Hindustan construction Co. Ltd dated 23 September 2006.
- /9/ Memorandum of understanding between Ministry of power and NHPC for CDM consideration dated 28 March 2006.
- /10/ Consents to Establish dated 16 August 2007 by Jammu & Kashmir state pollution control board.
- /11/ Environmental Clearance letter dated 30 May 2005 by Ministry of Environment & forests.
- /12/ No Objection Certificate from chief conservator of Forest.
- /13/ No Objection Certificate from archaeological survey of India
- /14/ Copy of EIA and EMP
- /15/ -Local newspapers "Daily Excelsior dated 1 Nov 2004 and Greater Kashmir dated 30 Nov 2004"
-Minutes of meeting signed copies by the local stakeholders
- /16/ Soft copy of IRR excel worksheet.
- /17/ Copy of Detailed Project Report- Feb 2004.
- /18/ Copy of letter from NHPC & Ministry of power for financial approval- 24 August 2006.
- /19/ Copy of letter from NHPC & Ministry of power for Subordinate loan – 23 November 2006.
- /20/ Memorandum of Association Of National Hydroelectric Power Corporation Limited.- 23 October 1975
- /21/ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>
- /22/ Cost estimate abstract of December 2005
- /23/ Central Electricity Regulatory Commission guidelines of 26 March 20045
(http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf) Chapter 3
CERC regulation page no 37 to 40,
- /24/ http://www.recindia.gov.in/download/int_rates_21_09_04.pdf,
- /25/ <http://www.powermin.nic.in>

Main changes between the version published for the 30 days stakeholder commenting period and the final version submitted for registration:



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- *The financials has been revised as per the Tools for demonstration of additionality version 04.*
- *Changes related to the CARs and CLs identified in the DNV's draft validation report.*

3.2 Follow-up Interviews with Project Stakeholders

During the period from 03 December 2007 to 04 December 2007 DNV performed the interviews to resolve the issues identified during the desk review of the project design document. Representatives of MGM International and NHPC were interviewed.

Table below shows the list of issues discussed during the site visits:

	Date	Name	Organization	Topic
/26/	2007-12-03	Mr. A K Sachdeva	NHPC	• Information of project construction
/27/	2007-12-03	Mr. G Baidya	NHPC	• The development of hydropower project in the region
		Mr. S H Zargar	NHPC	• Site location and approach
		Mr. Amresh Kumar	NHPC	• The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval)
		Mr. V K Karn	NHPC	• Project management
		Mr. Deepak Saigal	NHPC	• Emission reduction monitoring plan
		Mr. Shahid Ali Khan	NHPC	• Likely date of commissioning of the project activity
		Mr. Pardeep Singh Sidhhu	NHPC	• Technical specifications
		Mr. Shyam Dhar Shukla	NHPC	• PLF consideration and arrival methods
		Mr. S S Sharma	NHPC	• Stakeholder's consultation process
		Mr. P C Patra	NHPC	• Energy meter recording practices
		Mr. Saket N Niraj	NHPC	• Barriers faced by the project
				• Training to the personnel
				• Environmental and



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/28/ 2007-12-03 Mr. S.N. Jain

MGM
Internati
onal

community
development activities

- Community and environmental developmental plans
- Annex – I country approval for the project
- Alternatives to the project activity
- Stakeholders consultation and outcomes
- Barriers discussed in the PDD.

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to DNV Certification AS's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the “Nimoo – Bazgo Hydroelectric Project in India” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) CDM and/or methodology specific requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.



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Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities				
Requirement	Reference	Conclusion		
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.		

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (OK), or a corrective action request (CAR) due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.</i>

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation conclusion
<i>If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1: Validation protocol tables



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3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation Team

Role/Qualification	Last Name	First Name	Country
CDM Validator	Puratchikkanal	Ma Paa	India
GHG Auditor / Team Leader	Ravandur Satish	Nikesh	India
Sector Expert	Lehmann	Michael	Norway
Technical Reviewer	Sharma	Anjana	India

The qualification of each individual validation team member is detailed in Appendix B to this report.



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4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the revised PDD of 31 March 2009.

4.1 Participation Requirements

The project participant is National Hydro Electric Power Corporation Ltd (NHPC) from the host country India. India meets all relevant participation requirements.

The DNA of India has issued a Letter of Approval (LoA) /5/ on 10 August 2007, authorizing National Hydro Electric Power Corporation Ltd (NHPC) as a project participant and also confirming that the project assists in achieving sustainable development.

The validation did not reveal any information indicating that the project can be seen as a diversion of official development assistance (ODA) funding towards India.

4.2 Project Design

The proposed project is a new run-of-river hydropower plant built on the river Indus. It envisages utilizing the hydro potential available in the Nimoo and Bazgo branch of the Indus river.

The powerhouse comprises of three vertical shaft Francis turbine generators each of 15 MW, in total with a 45 MW capacity. The plant is expected to generate 236.94 GWh of electricity per year at a plant load factor of 60.71% /17/. The generated electricity will be exported to the northern grid system of the power development department, Jammu and Kashmir, a state government owned power transmission company.

The generated voltage at 11 kV will be further transformed to 66 kV to match the nearest substation voltage level. The project system boundaries include the concrete gravity dam of 57 m height, three penstock Intake, three penstocks of 3.3 meter diameter, powerhouse, power evacuation system and tailrace channel. The technology reflects current good practices.

The start date of the project activity is 23 September 2006 which corresponds to construction agreement signed with Hindustan construction Co. Ltd /8/. The life of the project is expected to be around 35 years. A renewable crediting period of seven years has been chosen, with the starting date of the crediting period to be from the 01 August 2010.

4.3 Baseline Determination

The project applies the approved baseline methodology ACM0002, version 06, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"/4/. The baseline methodology adopted is appropriate, applicable and justified as the proposed power generation project is a new grid-connected run-of-river hydropower project with a power density 13.16 W/m² /17/.

The project developer has identified following alternative baseline scenarios:

Alternative 1: Proposed project activity without CDM revenues.



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Alternative 2: Continuation of current practice i.e. same amount electricity will be generated by the power plants connected to the northern regional grid.

Alternative 3: Implementation of power plant based on other renewable energy sources like biomass, solar, tidal, wind or geothermal.

Alternative 4: Implementation of fossil fuel based power plant.

The detailed analysis of all the scenarios has been presented in additionality section (below). Based on the analysis of these alternative scenarios, alternative 2 has been selected as the baseline scenario.

As the project activity is feeding power to the JKSEB grid, which is a part of the northern regional grid, the baseline for this project activity is the function of the generation mix of this grid. The selection of the northern region grid as the grid system boundary for the project activity is in line with the recent EB guidance for large countries such as India. The baseline emission factor for the northern regional grid is established based on approved methodology ACM0002 using the combined margin approach. The PP has used the operating margin (OM) and build margin (BM) data published in the CEA /21/ database for calculation of the baseline emission factor. The Central Electricity Authority, Ministry of Power, Government of India has published a database of carbon dioxide emission factors from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. the CO₂ baseline database provides information about the OM and BM factors of all the regional electricity grids in India. DNV confirms that the database is an official publication of the Government of India for the purpose of CDM baselines. The OM in the CEA database is calculated *ex ante* using the simple OM approach and the BM is calculated *ex ante* based on 20% of the most recent capacity additions in the grid based on net generation as described in ACM0002. The average of the OM for the three years 2003-04, 2004- 05 and 2005 -06 has been determined and verified to be 0.986 tCO₂e/MWh and the BM to be 0.600 tCO₂e/MWh. The weighted average of the “operating margin” and the “build margin” emission coefficient for northern regional grid of India has thus been determined to be 0.793 tCO₂e/MWh (fixed *ex-ante*) generation project is a grid connected renewable power generation activity, a run of the river.

The grid emission factor data used in the emission reduction calculations of the proposed project was sourced from the data published by Central Electricity Authority (CEA), Government of India /21/. This body, under Government of India, is besides other functions, also responsible for the collection and recording of the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters; make it public from time to time the information secured. In the recent past, this organization took an initiative to make use of the available data (power plants, generation details, fuel consumptions and other relevant data) for the calculation of emission factor for different grids available in the country. The initiative was a contribution of the organization towards CO₂ emissions reduction commitment of Government of India. CEA being the central authority (under the government of India), data used by the CEA for emission factor calculations can be considered as the most authentic data related to the power plants, fuels and the generation details. Furthermore, the CEA calculations are based on the approved baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.



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DNV has verified the user guide published by CEA /21/ for the calculation of grid emission factor and found it to be in accordance with the methodology /4/.

4.4 Additionality

The additionality of the project has been established using the “tools for the demonstration and assessment of additionality” (version 4) approved by the CDM-EB /2/. The project activity primarily demonstrates the additionality through the investment analysis.

It has been demonstrated that the incentive from CDM was seriously considered in the decision to proceed with the project activity through the presented “Extract of Memorandum of understanding between ministry of power, Government of India and NHPC” dated 28 March 2006” /9/. This is prior to the starting date of the project activity 23 September 2006, which was determined by the construction contract /8/.

STEP 1: Identification of alternatives to the project activity consistent with current laws and regulations:

As mentioned in the baseline section, four alternatives to the project activity have been identified by the project developer:

Alternative 1: The project activity not undertaken as CDM activity

Alternative 2: Continuation of the existing scenario (No project activity implementation)

Alternative 3: Other renewable energy sources like solar, wind and Biomass.

Alternative 4: Implementation of fossil fuel fired power plants.

The project developer has analyzed all the alternatives to arrive at the realistic and credible alternative available to him. The result of analysis is as presented below:

Alternative 3: DNV was able to verify that the power plants based on the other renewable sources of energy like solar, wind and biomass are not a realistic and credible alternative for proposed project. It was confirmed that due to climatic conditions at the project location, there is no surplus biomass for the establishment of biomass based power generation unit. Furthermore, the wind based power generation units are also not a common practice at the project location i.e. Ladhak region (www.Windpowerindia.com/statwind2.html). DNV also confirmed that the solar technology is in the initial stages of its development in India and hence is expensive. Based on the discussion, evidences and also the observations made during the site visit, the alternative 3 has not been considered as a realistic alternative available to the project developer and has been eliminated from further discussion.

Alternative 4: DNV was able to confirm that the project owner is dedicated to only hydro power development (except for (a) wind and tidal and (b) geothermal and gas power plants were added in 1998 and 1999 respectively, but are not available at the project site) in India according to the memorandum of association /20/. Due to lack of experience in the development of fossil fuel based power plants, this alternative has not been considered as a credible alternative and has been eliminated from further discussion.

Hence, alternatives 1 and 2 are the only realistic and credible alternatives which are further considered for the additionality discussion in step 2 and 4 below. DNV was also able to confirm that these alternatives are in compliance with the existing legal requirements.

STEP 2: Investment analysis



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The project generates revenues other than CDM-related revenues and the alternative does not include an investment. Benchmark analysis was therefore chosen.

The benchmark selected is the Reserve Bank of India (RBI) prime lending rate for public sector banks as of December 2005, ranging 10.25% to 10.75%, where 10.25% is chosen as the most conservative value (<http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf>). The project developer has not included any risk premium to this PLR. DNV was able to confirm this rate, and accepts the priming lending rate as an appropriate benchmark given the reasonable premium compared to the loan interest. For this benchmark, project-IRR was considered appropriate as the financial indicator.

The parameters of the IRR analysis have been verified by DNV from supporting documents /6/8/17/18/19/. The electricity generation and plant load factor value used in the IRR calculations are directly taken from detailed project report (DPR) of February 2004 /17/. It was confirmed from the cost estimate abstract of December 2005 that the project cost is INR 611 crores /22/. The total investment can be divided into INR 183.3 crores (30%) equity, INR 270 crores sub-ordinate loan from the government of India and the above documents also states that the rest of project funding would be arranged by National Hydro Power Corporation (NHPC) through commercial bank loan. This was evidenced from the Approval letter dated 24 August 2006 and the letter regarding the sub-ordinate loan dated 23 November 2006 /18/19/. The tariff, depreciation charges, return on equity, interest on working capital and operational and maintenance charges were computed by the PP based on the Central Electricity Regulatory Commission Guidelines of 26 March 2004 /23/. The interest on loan from NHPC is 8% as per Rural Electrification Corporation limited applicable for all public sector projects /24/. The investment analysis was developed in December 2005, based upon the data sources as stated above. The electricity generation value and load factor taken from the DPR from 2004 was confirmed to still be valid at the time of the development of the financial analysis and at the project starting date, 23 September 2006 /8/, during validation of the project. The investment costs were confirmed to be valid from the two letters dated 24 August 2006 and 23 November 2006 respectively /18/19/. According to the Central Electricity Regulatory Guidelines of 26 March 2004 /23/, the values obtained from this document should remain in force for a period of five years and hence applicable at the time of the development of the investment analysis and the project starting date. DNV was able to confirm that changes in the interest rate in the time period between 2004 to 2006 have led to an increased interest rate, hence the interest rate based on a source from 2004 is conservative. All the assumptions are considered pertinent at the time of decision. The tariff is worked out based on the CERC regulations of March 2004. Accordingly the first year sale rate was worked out at INR 2.71 per unit as per existing CERC guidelines for tariff fixation at the time of signing PPA in October 2005 /7/. The IRR is worked out by adopting first year sale rate as constant tariff as per the existing practice being adopted by the Project Appraisal & Management Division, Planning Commission for Hydroelectric projects. There is no escalation considered in the IRR sheet this is due to the existing practice being adopted by the Project Appraisal & Management Division, Planning Commission for Hydroelectric projects. Furthermore, the IRR spreadsheet has been verified and found correct. The project-IRR over 35 years without CDM was calculated to be 7.6%. DNV is able to confirm that the financial model presented is in accordance with the EBs latest guidance on assessing the financial analysis.



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The project developer has carried out a sensitivity analysis to check the robustness of the financial model presented. Critical parameters, i.e. parameters contributing more than 20% to costs or revenues, have been considered for the analysis: total investment cost, annual O&M expenses, electricity generation.

If capital cost reduces by 25%, the IRR of the project touches the benchmark. However, DNV was able to confirm that this much reduction in the project cost is not realistic. It has been confirmed that the project cost (INR 611.01 Crores) is higher than a normal hydropower plant of similar size (INR 180 Crores according to http://mnes.nic.in/shp/cost_ror_power.htm). However, this is mainly because of the location of the project in a very remote area at higher altitude. The temperature in the winter season reaches minus 35°C. Due to the higher altitude, the atmospheric pressure is less which consequently reduces the efficiency of man and machine. During site visit DNV was able to confirm these facts. Furthermore, DNV was also able to confirm that the project site is not accessible by road, the equipments have to be air lifted and cost of manpower is also very high due to non availability in the project region /22/. If the electricity tariff increases by 28%, the IRR would increase to 10.25%, the benchmark value. However, DNV was able to confirm that this much increase in tariff is not a likely scenario in Indian power sector. For this project, the power purchase agreement (PPA) was signed prior to the start date of construction of power plant and that agreement is valid for 35 years. In accordance with the PPA, tariff is based on notifications/orders/directions issued by CERC. Considering this fact, DNV is of the opinion that variation in tariff over the validity period of power purchase agreement can not be ruled out completely but that will be only to a small extent. The huge increase in tariff of 28% from the original tariff considered for the IRR analysis seems unreasonable.

If the electricity generation increases by 28%, the IRR would reach the benchmark of 10.25%. As mentioned above, plant load factor for the proposed project was verified from the detailed project report which was based on the historical hydrological study data. a 28% increase seems unrealistic.

In case on annual O&M costs, even if it falls to zero, the IRR would only increase to 8.99%. O&M cost variation can therefore not cause the IRR to pass the benchmark.

None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

Based on the above discussion, in DNV's opinion, the proposed project activity is not economically or financially attractive. Moreover, the investment analysis is presented in a transparent manner and all the relevant assumptions are provided, clearly presenting and justifying the critical parameters and assumptions. The soft copy of IRR sheet is uploaded with the registration package for reference /16/.

STEP 3: Barrier analysis

Not applicable (only Step 2 is selected).

STEP 4: Common practice analysis

The common practice analysis is based on the hydropower generation units in the state. It has been observed that the contribution of hydropower plants less than 50 MW in the state of Jammu and Kashmir is only 1.6% of the total generation which clearly indicates that the



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project is not a common practice in the state of Jammu and Kashmir. The project developer extended the region for common practice analysis and included northern regional grid. It has been observed that even in the northern grid of India, the contribution of hydropower generation units less than 50 MW is only 0.8% of total grid generation of Northern grid /21/. This confirms that the hydro projects are not common practice in the northern region of India. The prevailing practice of investments in fossil fuel based conventional power plant is due to better return on investment, economies of scale and easy availability of finances and fuel resources.

The common practice analysis conducted by the project participant takes into consideration all hydropower projects in the state of Jammu & Kashmir (complete list as provided in annex 3 of the submitted PDD) at the time of investment decision for the project activity (23 September 2006).

The power sector in India can be divided into two phases, pre 2003 and post 2003 when the power sector reforms of 2003 were introduced (Electricity Act 2003) /25/, with the main objective to promote competition through private party participation, rationalization of electricity tariff, constitution of electricity authority and regulatory commissions to develop and regulate power sector in India. The basic differences in the pre and post 2003 scenarios are as follows .

TABLE A /25/

Before Electricity Act 2003	After Electricity Act 2003	Results
State Electricity Boards (SEB) had monopoly in Power sector (no private participation was allowed).	Private Participation is encouraged	Prompting Competition in Power Sector.
Power sector was considered as a single entity (no concept of generator transmitter & distributor)	Power sector was divided into three independent segments (generator, transmitter & distributor)	Promoting competition between generators & distributors to supply electricity at competitive price.
Open access to transmission systems was not permitted.	Any generating company or licensee and any consumer can avail open access of Transmission System.	A consumer can avail supply from a totally different generating company or licensee using the existing supplier as just a “common carrier providing non-discriminatory open access” resulting in competition between different generating companies and different distribution licensees.
Capital Subsidies was available to state utilities.	Gradually reduction in subsidy	Forced utilities to Function as Companies with commercial outlook.



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Tariff was regulated by state governments.	Constitution of Independent Electricity Regulatory Commission to increase transparency in the tariff determination.	For promoting competition among distribution licensees, fix only maximum ceiling of electricity tariff for retail sale of electricity. Liberty to Licensee to choose generating company to create competition between different generating companies.
SEB is solely responsible for electricity distribution.	More than one distribution company can be allowed in a single area with their own distribution network.	Resulted in healthy competition between distribution companies & provided a choice to consumer.
Tariff was regulated by state governments.	No tariff fixation by regulatory commission if tariff is determined through competitive bidding or where consumers or being allowed open access enter into agreement with generators/traders.	Resulting in competition & rationalization of electricity tariff
No concept of Banking, Wheeling & trading.	Concept of Banking, Wheeling & trading was introduced.	Promoting competition between distributors to supply electricity at competitive price.
No penalty to SEB for not meeting the standards.	Failure to meet standards (grid standards, standard of performance by licensee) will result in liability to pay compensation or even cancellation of license.	Improvement in Quality & reliability of power supply.

With the above background, DNV could confirm that the common practise analysis conducted by the project participant takes into consideration all hydropower projects in the state of Jammu & Kashmir (compete list as provided in annex 3 of the submitted PDD) at the time of investment decision for the project activity (23 September 2006)

As per the database of the Central Electricity Authority (GOI) /21/, there were 10 hydro power projects in the state of Jammu & Kashmir at the time of investment decision. All the power projects were implemented prior to the power sector reforms of 2003 either by the state utilities (State Electricity Board) or Central Government Utilities. They enjoyed much more favorable



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economical conditions than the project plant and are therefore not similar activities to be further considered in the common practice analysis.

In addition, only one of the 10 hydro power projects are of comparable size to the project activity (20-70 MW) and can for that reason be excluded from the common practice analysis.

- 4 out of the 10 hydro power projects are significantly larger (Salal I & II, with an installed capacity of 690 MW; Uri, with an installed capacity of 480 MW; Lower Jhelum at 105 MW and Upper Sindh I & II with an installed capacity of 127.6 MW)
- 5 of the remaining 6 hydro power projects (table B) are run of river power plants (in the range of 3.75 MW to 15 MW) and significantly smaller.

The last hydro power plant is a 30.8 MW power plant which is included in the comparison in the table below. This power plant is excluded, in addition to construction year, by factors of climatic conditions, accessibility to site and availability of transmission network.

TABLE B

Plant Name	Installed Capacity	Date of commissioning /21/	Type of Plant	Accessibility to site*	Transmission Network*	Climatic Condition
Nimoo-Bazgo (project activity)	45 MW	Aug 2010	Run of River	No	No	Extreme
Gandharbal	15MW	1955-63	Run of River	Yes	Yes	Moderate
Mohara	9MW	1962	Run of River	Yes	Yes	Moderate
Chenani I & III	30.8MW	1971-2000	Run of River	Yes	Yes	Moderate
Kargil	3.75MW	1995	Run of River	No	Yes	Extreme
Stakna	4MW	1986-87	Run of River	Yes	Yes	Moderate
Sewa III	9MW	2002	Run of River	Yes	Yes	Moderate

*Based on the geographical location of the project activity & availability of transmission network prior to the start of construction of projects

DNV would also like to reiterate that the project activity can not be compared to the six hydro power plants, and hence not a common practice in the state of Jammu and Kashmir, due to the following reasons

- a) The plants were all commissioned before power sector reform in 2003 (Electricity Act 2003).
- b) due to factors of extreme climatic conditions (such as high altitude, low oxygen levels, & temperature in the winter season reaches minus 35 degrees Celsius in case of project activity), accessibility to site and availability of transmission network.



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c) the capacities are significantly smaller (less than half the capacity of the project power plant) for 5 out of 6 power plants.

By expanding the scope of the common practice analysis to the Northern Grid of India in the 50-70 MW range, 4 hydro projects were found. One project, WY. Canal A-D-(62.5 MW), is canal-based hydro project and hence not comparable to the project activity which is a run of the river project. The remaining 3 hydro projects (Bassi-62.5 MW, Giribata-60 MW, and Dhalipur-51 MW) were all commissioned in 1965-1992, i.e. before the power sector reform of 2003 in India /25/. Hence even by considering power plants up to 70 MW in the entire Northern Grid of India, the project has been shown not to be common practice. The project activity is for the above mentioned reasons deemed by DNV not to be a common practice in the state of Jammu and Kashmir.

In conclusion, the assessment of the arguments presented above is deemed to sufficiently demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.

4.5 Monitoring

The project applies the approved monitoring methodology ACM0002, version 6, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources". The organizational structure and responsibilities are clearly defined. Procedure for calibration, records of calibration, and maintenance of monitoring equipment are clearly stated. The authority and responsibilities for measuring, recording, reporting, monitoring, and controlling of the monitored parameters and review of performance are also delineated. .

The grid emissions factor has been fixed ex-ante for the entire first crediting period of seven years. The only parameter to be monitored ex-post is electricity generated and exported to the grid. This will be done by installation of main and check meters. The monitoring frequency will be hourly and recorded monthly.

Monthly aggregate energy supplied to the grid will be monitored and can be cross verified with the energy bills. Training is provided by the suppliers of the equipments. Adequate procedure for carrying out internal audit has been established. Surface area at full reservoir level will be monitored once before the start of operation of the project activity as per the methodology requirement. All monitoring factors as per the monitoring methodology have been adequately addressed in the monitoring plan. Thus, the monitoring methodology will give adequate opportunity for real measurements of achieved emission reductions.

4.6 Estimate of GHG Emissions

The project will partly displace fossil fuel-based electricity generation.

Project emissions: It was verified during the site visit that, the project developer will use two diesel (2 X 500 KVA, one standby) generators during start up and emergencies. The GHG emissions per year due to operation of diesel generators were observed to be very small and hence were eliminated from the emission reduction calculations. Furthermore, DNV verified that the power density is 13.16 W/m^2 /17/ which is greater than 10 W/m^2 . Based on the evidences verified and the observations made during the site visit, the project emissions have been considered zero.



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Baseline emissions have been calculated by multiplying the net electricity supply to the grid and the emission factor of the northern regional grid. As stated above, grid emission factor has been fixed *ex ante* for the entire first crediting period. The net electricity supplied to the grid will be monitored *ex post* and the same will be used to baseline emission calculations during the crediting period. For estimation of baseline emissions, the project developer has assumed the electricity generation as 236.93 GWh based on a PLF of 60.71% (verified from the DPR). The baseline emissions have been estimated to be 187 893 tCO₂ per year, based on an *ex-ante* fixed baseline emission factor of 0.793 tCO₂e/MWh. The project developer has used the OM and BM data published in the latest CEA database 2005 -2006, for calculating the baseline emission factor, as described in section 4.3 of this report. The PDD was web hosted during 31 October 2007 to 29 November 2007. The combined margin emission factor used in the published PDD for emission reduction calculations is 0.76 from December 2006, but the latest emission factor available in CEA website at that time was June 2007 data. This emission factor value was referred from the Central Electricity Authority website – CO₂ baseline database – version 1.1 dated December 2006 /21/. The combined margin emission factor was cross checked during validation and was found outdated at the time of submission of the PDD for web hosting. Hence a clarification was raised in the validation report to use the latest data available at the time of PDD submission, i.e., CO₂ baseline database version 02 dated June 2007. Based on the CEA baseline database version 02, the combined margin was revised to be 0.793 in the final PDD submitted for registration. Hence there is a change in combined margin emission factor. DNV was able to confirm that this was the latest data available at the time of PDD submission for validation in year 2007.

Leakage: Leakage has been considered as zero for the proposed project activity in accordance with ACM0002.

The emission reductions calculations have been verified by DNV and are found to be in line with the baseline methodology ACM0002.

4.7 Environmental Impacts

The project proponents have obtained necessary environmental clearances to the project. This has been verified by DNV and confirms no land submergence and resettlement issues are involved, the proposed project site is not a notified area nor is there any threat to the fauna/flora /11/ - /13/.

The official agencies established for the purpose of environmental protection, the Jammu and Kashmir State Pollution Control Board and the Department of Environment, Government of Jammu and Kashmir, have issued the necessary permits to establish the project /10/ /14/.

4.8 Comments by Local Stakeholders

Consultations have been held with the members of the village panchayat, the local self governing body at the village level and with a cross section of local villagers. The local population has accepted the proposal to establish the project and has requested for up gradation of the approach road and bridges, proper arrangements for maintenance of uninterrupted water supply for irrigation, to protect the hot springs under the submergence etc. Other stakeholders, mainly comprising of various governmental bodies have issued the necessary license for the operations./10/ - /15/



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4.9 Comments by Parties, Stakeholders and NGOs

The PDD of “01 July 2007 version 01” was made publicly available on DNV’s climate change website (<http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=1560>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from “31 October 2007” to “29 November 2007”.

No comments were received during this period.

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	CAR 1 OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK

Requirement	Reference	Conclusion
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	CL 40 OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the	CDM Modalities and Procedures §37e	OK

Requirement	Reference	Conclusion
CDM Executive Board.		
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <i>The project design is assessed.</i>					
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	DR / I	/1/	The project activity is proposed to be developed at Alchi Village of Leh district.in the state of Jammu & Kashmir in India. The geo-graphical co-ordinates of the project are 32.17°and 36.58° north latitude and 37.26° and 80.30° east longitude.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	DR/ I	/1/	Yes, the project's system boundaries are defined clearly. It includes run-of-the-river hydro power generation units and the northern regional electricity grid to which the generated power is dispatched.		OK
A.2. Participation Requirements <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i>					
A.2.1. Which Parties and project participants are participating in the project?	DR I	/1/ /5/	India and The Netherlands are the two Parties participating in the proposed project activity. India is the Host country and The Netherlands is the Annex I Party identified		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			for the proposed project activity. National Hydroelectric Power Corporation Limited is the project participant from host country. MGM Carbon portfolio, S.a.r.l, Netherlands is the project participant from Annex I country.		
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	DR I	/1/ /5/	The Letter of Approval from the DNA of India has been received and verified. The Letter of Approval from DNA of Netherlands needs to be provided for verification. The Netherlands name is removed in the revised version of PDD, hence it is not required.	CAR-1	OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	DR I	/1/ /5/	Both, India and Netherlands, fulfil the requirements for participating in a CDM project activity. Both have ratified the Kyoto Protocol and have established the designated national authorities. India ratified the Kyoto Protocol on 22 August 2002. The Designated National Authority of India is Ministry of Environmental and Forests. Annex 1 Party: The Designated National Authority of Netherlands is Ministry of Housing, Spatial		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Planning and the Environment. Netherlands ratified the Kyoto Protocol on 31 May 2002. The Netherlands name is removed in the revised version of PDD.		
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	DR/ I	/1/ 	No public funding from any Annex-1 countries is available for the project activity.		OK
A.3. Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.3.1. Does the project design engineering reflect current good practices?	DR/I	/1/ /6/	Yes, the project includes installation of three vertical shaft Francis turbine with the rated output of 15MW each, with an efficiency of 91%. The other structures comprise of 57 M high gravity based concrete dam, penstocks, tail race pool, power house, transformer system and switch yard for evacuation of power. Thus the engineering design reflects current good practices.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	DR I	/1/ /6/	The technology used for the project is already available in the host country. The purchase order copy of the equipment to	CL1	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			be furnished to confirm the capacity of the power plant. The Purchase order placed on BHEL was verified.		
A.3.3. Does the project make provisions for meeting training and maintenance needs?	DR	/1/	The training needs for the project activity has not been addressed in the PDD. This is addressed in the revised version of PDD.	CL 2	OK
A.4. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	DR I	/1/ /5/	Yes, Host country Letter of approval dated 10 August 2007 has been verified		OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	DR /I	/1/	Yes. As a renewable energy project, it will produce positive environmental and economic benefits and contribute to the local sustainable development, particularly through the mitigation of shortage of power supply in the local areas, provision of new job opportunities for local people and aid in economic development of the region		OK
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	DR	/1/ /4/	Yes. The project applies the methodology of ACM0002 version 06 (19 May 2006) “Consolidated baseline methodology for grid-connected electricity generations from renewable sources” approved by the EB.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	DR I	/1/ /4/ /17/	Yes, the project activity meets the applicability criteria of ACM0002 and is justified as under : <ul style="list-style-type: none">• The project activity involves an electricity capacity addition from a run – of – river hydro power plants with power density of 13.16 W/m².• The geographic and system boundaries for the relevant electricity grid have been clearly identified to be the Northern electricity grid of India.• The project activity doesn’t involve switching from fossil fuels to renewable energy at the project site. The project activity will displace fossil fuel based electricity that would have otherwise been provided by the operation and expansion of the grid.	CL3	OK

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			The power density of the project activity needs to be demonstrated with proof. The power density was verified by hard copy of the DPR.		
B.2. Baseline Scenario Determination <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>					
B.2.1. What is the baseline scenario?	DR I	/1/ /4/	The baseline scenario is that in the absence of the project activity, equivalent amount of energy would have been generated from the existing plants or new capacity additions using the fossil fuels in the northern grid to which the project activity is connected.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	DR	/1/	Yes, Implementation of the project activity without CDM consideration has been discussed as other alternative scenario. Investment analysis and common practice analysis is chosen to demonstrate that the selected baseline scenario is the most appropriate one and is a realistic alternative consistent with current laws and regulations.		OK
B.2.3. Has the baseline scenario been determined according to the methodology?	DR	/1/ /4/	Yes, the baseline scenario has been selected in accordance with the baseline methodology ACM0002. The baseline as per the methodology is the electricity generated by		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the project times the grid emission factor of the connected grid calculated as per the guidelines provided.		
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	DR I	/1/	The baseline scenario has been determined using conservative assumptions.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	DR/ I	/1/	Yes. All relevant national and sectoral policies, regulations and department rules and disciplines are considered.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	DR	/1/	Literature and sources needs to be clearly mentioned in the PDD. All the sources, references need to be provided for verification. The reference documents are clearly mentioned in the revised and were verified by DNV.	CL-3	OK
B.2.7. Have the major risks to the baseline been identified?	DR I	/1/	There are no significant risks envisaged to the baseline.		OK
B.3. Additionality Determination <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>					
B.3.1. Is the project additionality assessed according to the methodology?	DR/I	/1/ /2/	Additionality has been demonstrated in accordance with the “Tool for demonstration	CL-4	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
		/6/ /7/ /8/ /9/ /16/ /17/ /18/	<p>& assessment of additionality (ver-4)”-</p> <p><u>Step 1a: Identification & justification of plausible alternative:</u></p> <p>The implementation of the proposed project activity without CDM & continuation of current practice has been discussed for electricity generation.</p> <p><u>Step 1b:</u> Since implementation of the proposed project activity faces investment and common practice barriers, continuation of current situation is considered as baseline scenario and is consistent with current laws and regulations.</p> <p>The project developer needs to provide a justification for not considering the alternative of electricity generation from fossil fuels and coal, other renewable sources like wind, solar and biomass. The PP has discussed the fossil fuel, coal fired and other renewable sources alternatives like solar, wind and biomass for power generation in the revised PDD.</p> <p><u>Step 2: Investment analysis:</u></p> <p>To demonstrate the additionality of the project, NHPC have chosen Option II – Investment comparison analysis. The levelized cost of electricity production of electricity and IRR of the project are chosen</p>		

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			<p>benchmark and</p> <p>ii) assess the likelihood of the parameter having this value to confirm that it is not likely that the IRR will become equal to the benchmark. This is addressed in the revised PDD.</p> <p>Based on the CL4 raised during desk review, the PP has revised the financials to option III bench mark analysis of additionality tools. The IRR is discussed on the Prime lending rate of 2005 and 2006. The bench mark considered is 10.25% without market risk premium, which is conservative. The PP has worked out internal rate on return and it was found to be 7.6% without CDM revenues.</p> <p><u>Step 3: Barrier Analysis:</u> <i>Not considered for analysis.</i></p> <p><u>Step 4: common practice analysis-</u> It is stated in the PDD that the net generation from the small hydro power plants (capacity less than 50 MW) is only 0.8 % of the total net generation of the northern grid. It has also been stated that the dominant thermal power</p>		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>generation adds up to 74% of the total grid generation. However, the project developer is requested to provide an evidence for this statistics. CEA website data verified.</p> <p>The project developer has also stated that there is minimal private sector participation in the hydroelectricity generation in India and the proposed project is one of its kind in the region. However, the project developer is requested to clarify this as the project developer itself is Government owned. The project developer is requested to clarify as to how this discussion is applicable for his project. This is removed in the revised PDD.</p> <ul style="list-style-type: none">• Furthermore, in investment analysis, the project developer has considered Option II – Investment comparison analysis for the demonstration of investment barrier. However, investment comparison analysis has not been done in accordance with the “Tools for the demonstration and assessment of additionality. The project		

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			<p>developer has compared the levelised cost per unit for the proposed project activity with the cost per unit of thermal energy generation technologies. However, as per tools, the comparison should be carried out for the alternatives considered for the proposed project activity (which in current case is the grid electricity). Same comment is applicable to the IRR analysis also. The project developer is requested to justify the selection of this Option for investment analysis. The project developer is also requested to refer to the “Tools for the assessment and demonstration of additionality” for demonstrating the investment barrier.</p> <ul style="list-style-type: none">• Purchase order copy of equipments needs to be provided.• The project developer is also		

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			<p>requested to justify (along with the documentary evidence) the PLF assumed for the proposed project. The same needs to be clearly stated in the PDD.</p> <ul style="list-style-type: none">• The project developer has also stated that all the power plants below 50 MW are considered as small scale projects in India. However, as per Ministry of Non conventional Energy Sources, small hydro power plants includes power plants up to 25 MW The same needs to be clarified.• Loan sanction letter to the furnished.• Detailed project report needs to be provided.• Power Purchase Agreement needs to be furnished. <p>All the above mentioned documents were provided for verification and the issues are addressed in the revised PDD.</p>		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	DR	/1/ /2/	Yes, additional evidences as stated in above section are to be provided.	CL-4	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	DR	/1/ /2/	Yes, additional evidences as stated in above section are to be provided	CL 4	OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	DR/I	/1/ /8/ /9/	<p>No, The starting date of the project as per the Published PDD is 1 August 2010 (date of commissioning).</p> <p>However, in accordance with the EB's latest guidelines regarding the start date, it should be the earliest of the construction, implementation or real action start date. The project developer is requested to change the project starting date accordingly.</p> <p>The start date is revised to construction agreement signed date 23 Sept 2006 in the revised PDD.</p> <p>➤ The proof for start date of the project has to be furnished.</p> <p>Construction agreement signed copies were verified by DNV.</p> <p>The project developer is also requested to provide an evidence that the benefits of CDM were considered seriously prior to deciding to proceed with the project.</p> <p>The CDM consideration letter was verified by DNV.</p>	CL 5	OK

* MoV = Means of Verification, DR= Document Review, I= Interview
CDM Validation 2007-1991, rev.02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.4. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	DR I	/1/	<p>Since the project activity involves generation of electricity using hydro resources, no project emissions are envisaged.</p> <p>However, the project developer is requested to clarify if the project activity uses any fossil fuel based power generation for emergencies.</p> <p>It is mentioned in the revised PDD, two Nos of 500KVA diesel generators will be used in case of emergencies.</p>	CL-6	OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	DR	/1/	Refer to B.4.1	CL-6	OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	DR	/1/	Refer to B.4.1.	CL-6	OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	DR/I	/1/ /4/ /6/	Baseline emissions have been estimated as the product of electricity generated in the project activity per year and grid emission factor of the Northern regional grid, which have been obtained from the official CEA data. The installed capacity of project plant is 45 MW and the plant is expected to export an average of 239.30 GWh electricity to the Northern Regional Grid per year. Latest CEA data to be used for calculations. The revised version 04 of PDD use the latest 2005-2006 data.	CL -6	OK
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	DR	/1/ /4/	Yes. The chosen baseline is in accordance with the baseline methodology ACM 0002. The chosen baseline is transparent and the choice of emission factor of the current generation mix used for estimation of emission coefficient is conservative.		OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	DR /I	/1/	There are no major risks envisaged to the baseline in the PDD.		OK
B.6. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values</i>					

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CDM Validation 2007-1991, rev.02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>– where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	DR	/1/ /4/	No leakage effect needs be accounted under this Methodology ACM0002.		OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	DR	/1/ /4/	Refer to B.6.1		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	DR	/1/ /4/	Refer to B.6.1		OK
B.7. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	DR /I	/1/	The project activity on implementation as stated is expected to result in emission reduction of 187 893 tCO ₂ e annually through out the renewable crediting period of 7 years.		OK
B.8. Monitoring Methodology <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	DR I	/1/ /4/	Yes, the monitoring plan documented according to the approved Consolidated methodology ACM0002 is complete and transparent.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	DR I	/1/	This is not addressed in the PDD. The revised version of PDD address that, the data will be archived for two years after the end of crediting period.	CL-7	OK
B.9. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	DR /I	/1/ /4/	Since the project activity involves generation of electricity using hydro resources, no project emissions are envisaged. However it needs to be clarified if fossil fuels would be used for emergency power supply. It is mentioned in the revised PDD; 2 Nos of 500 KVA diesel generators will be used in case of emergencies. It has to be clarified that during winter season how the water flow will be maintained due to the formation of ice flakes, if any heating coils are used the same to be monitored. No heating coils will be used during the winter seasons.	CL-6	OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed	DR	/1/	Refer to B.9.1	CL-6	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
appropriate?					
B.9.4. Is the measurement equipment described and deemed appropriate?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.6. Is the measurement <i>interval</i> identified and deemed appropriate?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.7. Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	DR	/1/	Refer to B.9.1	CL-6	OK
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	DR	/1/	Refer to B.9.1	CL-6	OK
B.10. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					

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CDM Validation 2007-1991, rev.02

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.10.1.Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	DR/I	/1/	Yes, the monitoring plan provides for the collection and archiving of all the relevant data necessary for the estimation of the GHG emissions.		OK
B.10.2.Are the choices of baseline GHG indicators reasonable and conservative?	DR	/1/	Yes, the choice of baseline GHG indicator of CO ₂ is reasonable.		OK
B.10.3.Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	DR	/1/	Yes. The project uses the ex-ante determination of emission factor for grid electricity. Only electricity generated will be monitored and double checked with the check meter.		OK
B.10.4.Is the measurement <i>equipment</i> described and deemed appropriate?	DR I	/1/	Yes, the PDD mention the measuring equipment that is proposed to be installed. The project includes installation of energy meters at High and Low Voltage sides of unit and station auxiliary transformers, installation of main tariff meter, check tariff meter and stand by meter for tariff. The project is yet to start and hence at this stage this is deemed appropriate. Detailed specifications for the project measuring equipments to be furnished. Digital meters will be installed to measure the electrical energy generated.	CL-8	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	DR/ I	/1/	Yes it is mentioned that, two meters, one main meter and one check meter will be installed with accuracy of 0.2%		OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	DR	/1/	Yes.		OK
B.10.7. Is the registration, <i>monitoring, measurement</i> and <i>reporting</i> procedure defined?	DR	/1/	Yes.		OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	DR/I	/1/	The procedures for maintenance of the monitoring equipment and installations need to be formalized. This is addressed in the revised PDD. The calibration intervals shall follow the national standards and rules.	CL-2	OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	DR	/1/	The procedures for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation) are not identified in the monitoring plan in PDD. The revised PDD address the above issues.	CL-7	OK
B.11. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data	DR	/1/	No leakage effect needs be accounted under this Methodology ACM0002.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
necessary for determining leakage?		/4/			
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	DR	/1/ /4/	Refer to B.11.1		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	DR	/1/ /4/	Refer to B.11.1		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	DR I	/1/	Host country India does not call for monitoring the sustainable development indicators.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	DR I	/1/	The DNA of India does not require monitoring of sustainable development indicators.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	DR I	/1/	Refer to B.12.1		OK
B.13. Project Management Planning					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.13.1. Is the authority and responsibility of overall project management clearly described?	DR/ I	/1/	Yes, The authority and responsibility of the project management has been identified in the PDD.Chief Engineer CDM will be responsible for overall project management.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	DR/I	/1/	No such information is available now, need to be formalized. This has been addressed in the revised version 02 of PDD	CL-2	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	DR /I	/1/ /4/	As the project activity is a hydropower project, no emergencies are foreseen which can cause unintended emissions.	CL-6	OK
B.13.4. Are procedures identified for review of reported results/data?	DR	/1/	No such information is available now, need to be formalized. The revised version 02 of PDD address this issues.	CL-7	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	DR	/1/	No such information is available now, need to be formalized. The revised version 02 of PDD address these issues.	CL-7	OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	DR/I	/1/ /6/ /8/ /9/	No, The starting date of the project as per the PDD is 1 August 2010 (date of commissioning), while it's operational lifetime is expected to be 35 years. However, in accordance with the EB's latest guidelines, the start date of the project activity should be the earliest of construction or implementation or real action start date. The project developer is requested to revise the start date accordingly. The start date is revised to construction agreement signed date 23 Sept 2006 in the revised version of the PDD.	CL-5	OK
C.1.2. Is the start of the crediting period clearly defined and reasonable?	DR	/1/	The start date of the crediting period is stated to be 1 August 2010.		OK
D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	DR /I	/1/ /10/ /11/ /12/ /13/ /14/	Yes. The project participant has done an EIA. The analysis of the environmental impacts of the project is described sufficiently in the PDD. • Copy of EIA need to be provided for validation. • Consents to establish from State	CL-09	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>pollution control board to be furnished.</p> <ul style="list-style-type: none"> The project developer is also requested to provide the environmental clearance from the central environment impact assessment authority (in accordance with the EIA notification 2006). <p>All the above documents were verified by DNV.</p>		
D.1.2 Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	DR/I	/1/ /10/ /11/ /12/ /13/ /14/	<p>Yes, EIA is required for any activity falls under schedule- 1 of Environment Impact Assessment Notification S.O.1533, dated 14/09/2006.</p> <ul style="list-style-type: none"> ➤ Copy of EIA need to be provided for validation. ➤ The EMP as provided in section D.2 of the PDD needs to be provided for verification. <p>All the above documents were furnished for verification.</p>	CL-09	OK
D.1.3. Will the project create any adverse environmental effects?	DR	/1/ /14/	<p>The project is not expected to create any significant environmental impacts, still the project proponent has prepared an Environmental Monitoring Plan to mitigate and prevent possible impacts of the project. Summary of EMP is provided in the PDD.</p>		OK
D.1.4 Are transboundary environmental impacts considered in the analysis?	DR	/1/	Yes.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
		/14/			
D.1.5 Have identified environmental impacts been addressed in the project design?	DR I	/1/ /14/	Yes, identified environmental impacts has been properly addressed in the PDD and included in Environmental Management Plan.		OK
D.1.6 Does the project comply with environmental legislation in the host country?	DR /I	/1/ /10/ /11/ /12/ /13/ /14/	It needs to be clarified during fallow up interview. The clearances from the Pollution Control Board and other statutory requirements need to be clarified with approvals. All the clearances documents were verified by DNV.	CL-09	OK
E. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>					
E.1.1. Have relevant stakeholders been consulted?	DR /I	/1/ /15/	It has been stated that the stakeholder have been consulted on 15 December 2004. Local stakeholders, representatives of the State pollution Control board, University of Jammu and Kashmir have been consulted. However supporting documents regarding stakeholder's consultation and the minutes of meeting needs to be provided apart from Environmental Public Hearing. Minutes of meeting signed copies by local	CL-10	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			stakeholders were verified by DNV.		
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	DR/I	/1/ /15/	This is not addressed in the PDD. News paper and minutes of meeting proof to be furnished. Local newspapers published inviting the stakeholders were verified by DNV.	CL-10	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	DR	/1/ /15/	Yes, it is mentioned in Ministry of Environment and Forest Notification S.O.1533, dated 14/09/2006, the stakeholder consultation process is required. The stakeholders were consulted as per the requirement of the host country.	CL-10	OK
E.1.4. Is a summary of the stakeholder comments received provided?	DR	/1/	Yes.		OK
E.1.5. Has due account been taken of any stakeholder comments received?	DR	/1/	Yes		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR1 Letter of Approval from Annex 1 country needs to be provided for verification.	A.2.1/A.2.2 A.2.3/A.4.1 B.12.1	<i>As Netherlands is no longer considered a party, then the LoA is not required for validation. Check that was deleted from section A.3 and Annex 1 of PDD.</i>	The annex I country name is removed in the revised version of PDD, the letter of approval from Netherlands is not required. CAR 1 is Closed.
CAR 2 In the sensitivity analysis, i) For each input parameter, determine the value at which the IRR will be equal to the benchmark and ii) assess the likelihood of the parameter having this value to confirm that it is not likely that the IRR will become equal to the benchmark.	B.3.1	<i>A sensitivity analysis has been done considering cost of the project, electricity sales and operation and maintenance cost.</i>	This is included in the revised version 02 of the PDD dated 11 April 2007. The sensitivity analysis is discussed by considering O & M, project cost and sale of electricity. DNV was able to verify that, with 25% reduction in the capital cost or electricity sale rate / tariff and generation was 28% higher, the IRR would reach the benchmark of 10.25%. Since, 25% decrease in investment is not possible due to the project location and increase in 28% in tariff is not a likely scenario in Indian power sector, there is a least possible of the project being financially attractive. Also, if the operation and maintenance cost is considered zero the IRR will just increase to 8.99%, still below the benchmark considered. This is in accordance with EB 39 guidelines.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			CAR 2 is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 1. The purchase order copy of the equipment to be furnished for confirmation of the capacity of the power plant.	A.3.2	<i>See file “Nimoo bazgo Contract Extract for capacity_CL1” in folder “CL_additional_files”.</i> <i>The capacity is 3x15MW: three turbines of 15MW each, adding up 45MW of installed capacity (Section A.4.3 of PDD)</i>	Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 12/06/2007 was verified with detailed technical specification and technology used. CL 1 Closed
CL 2. Training and maintenance are not addressed in the PDD. A clarification is requested.	A.3.3 B.10.8 B.13.2	<i>The project proponent develops hydro power projects as its main activity. Therefore, the only additional training needs for the project activity are related to monitoring, including the maintenance of monitoring equipment and installations, as well as instrument calibration.</i> <i>(See section A.4.3, B.7.2 of PDD)</i>	Training and maintenance needs are addressed in the revised Version 02 of PDD dated 11 April 2008. CL 2 closed.
CL 3. Clarify on the following: <ul style="list-style-type: none"> The power density computed for the project activity needs to be clarified with proof for the data utilized for computing the same. All references and literature sources as mentioned in the PDD needs to be provided.	B.1.2 B.2.6	<i>See file “Nimoo Bazgo Power density_CL3” in folder “CL_additional_files”. Note in figure-VII on page 3 of attached document that the area curve shows a flooded area of 3.42 km² for an elevation of 3093 m. The installed capacity is 45MW; therefore the power density is 13.16 W/m².</i>	DNV was able to verify from the detailed project report (DPR) that the total catchments area is 58880 Sq m. Power density is justified based on DPR extract. Based on this discussion, DNV is able to conclude that no project emissions are expected to occur due to this factor. - Hard copies of the reference documents like detailed project report, CEA data base, management approval

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			<p>for project, business scope letter from government of India etc., were verified.</p> <p>CL 3 Closed</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CL 4.</p> <ul style="list-style-type: none"> - It is stated in the PDD that the net generation from the small hydro power plants (capacity less than 50 MW) is only 0.8% of the total net generation of the northern grid. It has also been stated that the dominant thermal power generation adds up to 74% of the total grid generation. However, the project developer is requested to provide an evidence for this statistics. - The project developer has also stated that there is minimal private sector participation in the hydroelectricity generation in India and the proposed project is one of its kind in the region. However, the project developer is requested to clarify this as the project developer itself is government owned. The project developer is requested to clarify as to how this discussion is applicable for his project. - The project developer needs to provide a justification for not considering the alternative of electricity generation from other renewable sources like wind, solar 	<p>B.3.1 B.3.2 B.3.3</p>	<p><i>The text in Section B.5, step 4, sub-step 4a has been modified to show the details of the calculation and the source of the data.</i></p> <p><i>Sorry, this was a mistake. This section has been deleted (shown as strikeout in revised PDD, Section B.5, step 4, sub-step 4a).</i></p> <p><i>The text in the PDD (see section B.4, sub-step 1a) has been modified to include "Alternative 3 and 4: other renewable energy sources..." It is</i></p>	<p>- DNV was able to verify from the CEA website that in northern grid, thermal generation forms approximately 74% of the total generation.(www.cea.nic.in).</p> <p>- The project developer has deleted this sentence from the revised PDD, version 02 dated 11 April 2008</p> <p>- The revised PDD, version ,05 dated 10 July 2007 has addressed the other alternatives like coal, fossil fuels, wind, solar and biomass fired power plants. -</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>and biomass and thermal power plants.</p> <p>- In investment analysis, the project developer has considered Option II – Investment comparison analysis for the demonstration of investment barrier. However, investment comparison analysis has not been done in accordance with the “Tools for the demonstration and assessment of additionality. The project</p>		<p><i>shown that wind, solar and biomass and thermal are not viable alternatives to the project.</i></p> <p><i>The investment analysis has been redone using Option III – Benchmark analysis, as per additionality tool. For the sake of clarity, the previous analysis has been deleted, while the new text has been highlighted. See Section B.5, Step 2 of PDD.</i></p>	<p>Based on the discussion, DNV is able to conclude that setting up of a 45 MW capacity project with other renewables is not possible due to non availability of technology and resources for such large capacity. Also, it was also verified that the NHPC's main business is the hydro power generation. The wind, tidal, geothermal and gas power plants were added in 1998 and 1999 respectively. However, these resources are not available at the project site. The scope of business of NHPC was verified from Memorandum of association (www.nhpcindia.com). Based on this discussion, DNV is of the opinion that implementation of fossil fuel fired power plant is not a realistic alternative for the project developer.</p> <p>- Based on the CL4 raised during desk review and site interview discussions, the PP has revised the financials to option III, bench mark analysis of additionality tools in section B.5 of the revised PDD. The IRR is discussed on the Reserve Bank of India Prime lending rate of 2005 - 2006. The bench</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>developer has compared the levelised cost per unit for the proposed project activity with the cost per unit of thermal energy generation technologies. However, as per tools, the comparison should be carried out for the alternatives considered for the proposed project activity (which in current case is the grid electricity). Same comment is applicable to the IRR analysis also. The project developer is requested to justify the selection of this Option for investment analysis. The project developer is also requested to refer to the “Tools for the assessment and demonstration of additionality” for demonstrating the investment barrier.</p> <ul style="list-style-type: none"> - Purchase order copy of equipments needs to be provided. - The project developer is also requested to justify (along with the documentary evidence) the PLF assumed for the proposed project. The same needs to be clearly stated in the PDD. 		<p><i>Purchase order copy of equipment: See “Nimoo Bazgo Contract Extract for capacity_CL1” in folder “CL_additional_files”</i></p> <p><i>PLF: See extract of Detailed Project Report for Nimoo Bazgo in file “PLF.pdf” included in folder “CL_additional_files”. Note that the file includes data for two hydro plants (the other project is also being presented under the CDM). The data for</i></p>	<p>mark considered is 10.25%, without considering market risk premium as the PP is a government agency which is conservative.</p> <p>Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 12/06/2007 was verified.</p> <p>PLF has been verified to be 61% based on 95% machine availability from detailed project report..</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<ul style="list-style-type: none"> - The project developer has also stated that all the power plants below 50 MW are considered as small scale projects in India. However, as per Ministry of Non conventional Energy Sources, small hydro power plants include power plants up to 25 MW, The same needs to be clarified. - Loan sanction letter to the furnished. 		<p><i>Nimoo Bazgo can be found in page 1 of the attached document. The plant load factor in the conventional sense based on installed capacity is not applicable to hydro power plants, since the annual generation is calculated on the basis of water availability during the year. The annual generation is worked out on the basis of 95% machine availability and this should be treated as the plant load factor.</i></p> <p><i>The intention was to show that projects of the capacity of the proposed one are not a common practice in the region. Thus we have shown that hydro below 50 MW is only 0.8% of the total. See the first paragraph of this CL and the correction in Section B.5 of the PDD.</i></p> <p><i>NHPC has a loan agreement with Life Insurance Corporation of India for a certain amount (INR 65,000,000,000). No specific projects are mentioned in the agreement.</i></p>	<ul style="list-style-type: none"> - Based on the CEA website data, DNV was able to verify that power plants with capacity less than 50MW is not a common practice in the Jammu and Kashmir state and northern region of India. The revised PDD version 02 has removed the word “< 50 MW as small scale projects “ and has included less than 50 MW capacity is not a common practice in the project region. <p>Hard copy of Loan sanction letter was verified by DNV.</p> <p>It has been confirmed that the proposed</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<ul style="list-style-type: none"> - Management letter to Ministry of Power for approval of finance to be furnished along with supporting documents for project cost. - Detailed project report needs to be provided. 		<p><i>Approval letter is furnished to DNV with supporting documents</i></p> <p><i>Copy of DPR was furnished to DNV during site visit.</i></p>	<p>project will receive 30% as equity ie.; INR 183.30 crores, INR 270 crores as sub ordinate loan from Govt of India and remaining INR 157.7 crores will be commercial loan from LIC of India.</p> <p>- Copy of letter from NHPC to Ministry of power for financial approval– 24 August 2006 and</p> <p>Copy of letter from NHPC to Ministry of power for Subordinate loan – 23 November 2006 was verified by DNV.</p> <p>It was confirmed that the total project cost is around INR 611.01 crores</p> <p>- Hard copy of Detailed Project report was verified by DNV. The submerged area due to the implementation of project activity was verified and based on this the power density was calculated to be 13 .16 W/m2. The same has been verified from the detailed project report. DNV also verified the plant load factor of 61% at 95% machine availability.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<ul style="list-style-type: none"> - Power Purchase Agreement needs to be furnished. 		<p><i>Power Purchase Agreement has been provided to DNV India auditors.</i></p>	<ul style="list-style-type: none"> - PPA signed between NHPC and Power development department, Jammu & Kashmir dated 26 October 2005 was provided , DNV was able to verify that, installed capacity of the plant will be 45 MW, the PPA is for a period of 35 years, tariff will be as per notifications / orders issued by CERC from time to time, metering arrangements accounting of energy etc. from the PPA. <p>CL 4 closed</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CL 5.</p> <ul style="list-style-type: none"> • The start date of the project activity needs to be revised to earliest of construction/implementation/real action date. ○ Proof for CDM consideration to be furnished. 	<p>B.3.4 C.1.1</p>	<p><i>Government approval date was 24-8-06 (See file “Nimoo Bazgo Govt Approval for starting date_CL5” in folder “CL_additional_files”). Construction work to the contractor was awarded on 23-9-2006. Therefore, we have changed project starting date to 23-9-2006 in the PDD Section C. Equipment orders were placed in 2007. (See “Contract for Chutak Project Extract for capacity_CL1” in folder “CL_additional_files”).</i></p> <p><i>CDM was considered prior to project starting date. For instance, a Memorandum of Understanding with the Government of India mentions CDM and is dated 28-3-2006. A copy of the MoU was provided to DNV India auditors already. The relevant pages can be found in the attached file: “NHPC GOI MoU Extract.pdf” in folder “CL_additional_files”.</i></p>	<p>- The construction contract agreement issued on Hindustan construction Co. Ltd dated 23 Sept 2006 has been verified by DNV. The start date of the project is revised in the latest version 02 of PDD.</p> <p>- CDM consideration letter dated 28 March 2006 has been verified by DNV.</p> <p>CL 5 closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 6. Clarify if the project activity uses any fossil fuel for emergency power generation. Latest CEA data to be used for calculations	B.4.1 B.4.2 B.4.3 B.9.1 B.9.2 B.9.3 B.9.4 B.9.5 B.9.6 B.9.7 B.9.8 B.9.9 B.13.3	<i>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). (See Section A.4.3 of PDD).</i> <i>This is addressed in the revised PDD</i>	The use of Diesel generator sets in case of emergency is addressed in the revised PDD version 02 dated 11 April 2008. Since the DGs will be used only incase of emergencies and start ups, the project emissions will be negligible. Hence not considered. The revised PDD version 03 dated 12 May 2008 includes the latest 2005-2006 CEA data for calculations. CL closed.
CL 7. A clarification on storage of data during and after the crediting period is requested	B.8.2/B.10.1/B.10.9/B.13.4/B.13.5	<i>Monitored data will be kept for two years after the end of each crediting period or the last issuance of CE; whichever occurs later (See Section B.7.1 of PDD). Additional information is addressed in the monitoring plan presented in the PDD.</i>	This has been addressed in the revised version 02 of PDD. CL Closed.
CL 8. Detailed technical specifications for the metering needs to be furnished.	B.10.4	<i>For monitoring of the generation and transmission of power, a metering system using digital meters and</i>	This is addressed in the revised version 02 of PDD. CL closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<i>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. (See Section B.7.1 of PDD).</i>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 9 <ul style="list-style-type: none"> Consents to establish from State pollution control board to be furnished. Copy of EIA need to be provided for validation. All statutory clearances to be furnished. 	D.1.1/D.1.2 D.1.6	<i>All these documents have been sent to DNV India.</i>	<ul style="list-style-type: none"> ➤ Consents to Establish dated 16 August 2007 by Jammu & Kashmir state pollution control board was verified by DNV. ➤ Environmental Clearance letter dated 30 May 2005 by Ministry of Environment & forests was verified by DNV. ➤ NOC from chief conservator of Forest was verified by DNV. ➤ NOC from archaeological survey of India was verified by DNV. ➤ Copy of EIA and EMP was verified by DNV. <p>CL closed.</p>
CL 10. Clarify on the usage of communication media for stakeholders and community consultation process. Proof for the same needs to be furnished. Provide the minutes of the meeting for verification.	E 1.1 /E.1.2 E.1.3	<i>All these documents have been sent to DNV India.</i>	<p>The stakeholders were invited by two local newspapers “Daily Excelsior dated 1 Nov 2004 and Greater Kashmir dated 30 Nov 2004”</p> <p>Minutes of meeting signed copies by the local stakeholders were verified by DNV.</p> <p>CL Closed.</p>

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Ma Paa Puratchikkanal

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 30 October 2007

Michael Lehmann

Michael Lehmann

Technical Director, International Climate Change Services



CERTIFICATE OF COMPETENCE

Nikesh Ravandur Satish

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 4 January 2008

Michael Lehmann

Michael Lehmann

Technical Director, International Climate Change Services



CERTIFICATE OF COMPETENCE

Anjana Sharma

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--

Industry Sector Expert for Sectoral Scope(s):

Technical Reviewer for (group of) methodologies:

ACM0002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes
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Høvik, 1 June 2008

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	Yes
CDM Verifier:	Yes	JI Verifier:	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0030	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0031	Yes
ACM0004, ACM0012	Yes	AM0032	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0035	Yes
ACM0007	Yes	AM0038	Yes
ACM0008	Yes	AM0041	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0034	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0043	
AM0009, AM0037	Yes	AM0046	
AM0013, AM0022, AM0025, AM0039, AMS- III.H, AMS-III.I	Yes	AM0047	
AM0014	Yes	AMS-II.A-F, AM0044	Yes
AM0017	Yes	AMS-III.A	Yes
AM0018	Yes	AMS-III.E, AMS-III.F	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director