



VALIDATION REPORT

Chutak Hydroelectric Project in India

REPORT NO. 2007-1990

REVISION NO. 02



VALIDATION REPORT

DET NORSKE VERITAS
CERTIFICATION AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
<http://www.dnv.com>
Org. No: NO 945 748 931 MVA

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Approved by: Hendrik W. Brinks	Organisational unit: DNV Certification AS
Client: MGM Carbon Portfolio, S.a.r.l	Client ref.: Mrs. Ivana Cepon

Project Name: "Chutak hydroelectric project"
Country: India
Methodology: ACM0002
Version: 06
GHG reducing Measure/Technology: "Renewable energy power generation"
ER estimate: 1 66 831 tCO₂e 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 "*Chutak Hydroelectric Project*", India as described in the PDD, version 11, dated 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

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Report title: Chutak hydroelectric project in India		
Work carried out by: Ma Paa Puratchikkannal, Gaurav Srivastava (Trainee), Nikesh R S, Michael Lehmann		
Work verified by: Anjana Sharma		

Key words:

Validation
 Kyoto Protocol
 Validation
 Clean Development Mechanism

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Abbreviations

NHPC	National Hydroelectric Power Corporation
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERC	Central Electricity Regulatory Commission
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DG	Diesel Generator
DNV	Det Norske Veritas
DNA	Designated National Authority
DPR	Detailed Project Report
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
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
PLF	Plant Load Factor



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of “Chutak Hydroelectric Project in India”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country 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 fulfillment of stated criteria.

The host Party, India, fulfills the participation criteria and has approved the project and authorized the project participants. The DNA from India also 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 implemented.

The total emission reductions from the project are estimated to be on the average 1 66 831 tCO₂e/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 “Chutak 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 *Chutak 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 , Chutak Hydroelectric project Version 01, Dated 01 July 2007
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 02, Dated 11 April 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 03, Dated 12 May 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 04, Dated 13 June 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 05, Dated 10 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 06, Dated 14 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 07, Dated 23 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 08, Dated 29 April 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 09, Dated 30 July 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 10, Dated 06 August 2008
 - MGM Carbon Portfolio, S.a.r.l , Chutak Hydroelectric project Version 11, Dated 31 Mar. 09
- /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 methodology for grid-connected electricity generation from renewable sources"



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- /5/ ➤ Letter of Approval from the host Party India dated 10 August 2007
- DNA Meeting approval letter
- /6/ Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 16 August 2007
- /7/ Power purchase agreement 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 signed between NHPC and Ministry of power, govt of India for CDM consideration - 28 March 2006
- Draft Memorandum of understanding
- /10/ Consents to Establish dated 11 September 2007 by Jammu & Kashmir state pollution control board
- /11/ Environmental Clearance letter dated 17 November 2005 by Ministry of Environment & forests
- /12/ No Objection Certificates from chief conservator of Forest – 24 June 2004
- /13/ No Objection Certificate from archaeological survey of India
- /14/ Copy of EIA and EMP – Centre for environmental education and training university of Jammu – December 2004
- /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- January 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/ www.Windpowerindia.com/statwind2.html
- /23/ www.nhpcindia.com - Note that (a) wind and tidal and (b) geothermal and gas power plants were added in 1998 and 1999 respectively. However, these resources are not available at the project site
- /24/ <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf>
- /25/ http://mnes.nic.in/shp/cost_ror_power.htm



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- /26/ CERC regulations – March 2004, Chapter 3 CERC regulation page no 37 to 40) (http://www.cercind.gov.in/28032004/finalregulations_terms&condition.pdf)
- /27/ Rural Electrification Corporation limited – September 2004 (http://www.recindia.gov.in/download/int_rates_21_09_04.pdf)
- /28/ CEA website – CO₂ baseline data base - version 02 – Excel sheet (<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>)
- /29/ Corporate planning letter dated 14 June 2005
- /30/ Central Water Commission report
- /31/ Techno economic appraisal letter from CEA dated 23 April 2005
- /32/ Application for environmental clearance dated 10 July 2005
- /33/ NHPC Task force letter
- /34/ MoM ministry of power document
- /35/ MGM-IDBI offer letter
- /36/ NHPC –Letter of Intent for CDM consultancy
- /37/ <http://cwc.nic.in/>
- /38/ Salient Features of Chutak Hydroelectric Project (4x11 MW) in J&K by NHPC, Annexure I of the Ministry of Power, Government of India document F.No. 22/1/2001-DO (NHPC)

3.2 Follow-up Interviews with Project Stakeholders

DNV conducted the interviews on 03 December 2007, to resolve the issues identified during the desk review of project design document. Representatives of NHPC and MGM International were interviewed.

	Date	Name	Organization	Topic
/39/	2007-12-03	Mr. A K Sachdeva	NHPC	<ul style="list-style-type: none"> • Information of project construction • The development of hydropower project in the region • The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval)
/40/	2007-12-03	Mr. G Baidya	NHPC	
		Mr. S H Zargar	NHPC	
		Mr. Amresh Kumar	NHPC	
		Mr. V K Karn	NHPC	
		Mr. Deepak Saigal	NHPC	
		Mr. Shahid Ali Khan	NHPC	
		Mr. Pardeep Singh Sidhhu	NHPC	



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	Mr. Shyam Dhar Shukla	NHPC	<ul style="list-style-type: none"> • Project management • Emission reduction monitoring plan • Likely date of commissioning of the project activity • Technical specifications • PLF consideration and arrival methods • Stakeholder's consultation process • Energy meter recording practices • Barriers faced by the project • Training to the personnel • Environmental and community development activities • Community and environmental developmental plans
	Mr. S S Sharma	NHPC	
	Mr. P C Patra	NHPC	
	Mr. Saket N Niraj	NHPC	
/41/	2007-12-03	Mr. S.N. Jain	MGM Internatio nal <ul style="list-style-type: none"> • Annex – I country approval for the project • Alternatives to the project activity • Stakeholders consultation and outcomes • Barriers discussed in the PDD.

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

- *The financials has been revised as per the Tools for demonstration of additionality version 04.*



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- *Changes related to the CARs and CLs identified in the DNV's draft validation report*

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 Chutak hydroelectric project 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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<i>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</i>		
<i>Requirement</i>	<i>Reference</i>	<i>Conclusion</i>
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<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.</i>

<i>Validation Protocol Table 2: Requirement checklist</i>				
<i>Checklist Question</i>	<i>Reference</i>	<i>Means of verification (MoV)</i>	<i>Comment</i>	<i>Draft and/or Final Conclusion</i>
<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>

<i>Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests</i>			
<i>Draft report clarifications and corrective action requests</i>	<i>Ref. to checklist question in table 2</i>	<i>Summary of project owner response</i>	<i>Validation conclusion</i>
<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 reviews were performed by a technical reviewer qualified in accordance with DNV Certification AS's qualification scheme for CDM validation and verification.

3.5 Validation Team

Role/Qualification	Last Name	First Name	Country
GHG Auditor / Team Leader	Nikesh	Ravandur Satish	India
CDM Validator	Puratchikkanal	Ma Paa	India
Trainee	Srivastava	Gaurav	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 right bank of the Suru river. It envisages utilizing the hydro potential available in the Chutak village branch of suru river.

The powerhouse comprises of four vertical shaft Francis turbine generators each of 11 MW, in total with a 44 MW capacity. The plant is expected to generate 216.41 GWh of electricity per year at a plant load factor of 57% /17/. The electricity generation data of 216.41 GWh presented in the PDD is based on the figure sources from the detailed project report (DPR). The project proponent National Hydroelectric Power Corporation Ltd (NHPC) is a public sector company under administrative control of Ministry of Power, Government of India, and the DPR is verified by the Ministry of Power, Central Electricity Authority (Government of India), Public Investment Board of planning commission (Government of India) and various other governmental departments before the DPR gained the approval. Hence DNV considered the DPR as a transparent and authentic document for the project activity. The generation figure of 216.41 GWh is based on hydrological data and the DPR makes a clear reference to the study conducted by central water commission, Government of India report /30/.

The Central Water Commission is a premier Technical Organization of India in the field of Water Resources and is presently functioning as an attached office of the Ministry of Water Resources, Government of India. The Commission is entrusted with the general responsibilities of initiating, coordinating and furthering in consultation of the State Governments concerned, schemes for control, conservation and utilization of water resources throughout the country./37/

For the project activity, the water flow in the rivers was measured at Kargil, at Kochik, near Ashana and at Chelong on Suru and Chelong rivers. The average of 10 daily discharge series has been obtained to compute the average annual yield. The hydrology data available from 1978 -79 to 1999-2000 for a period of 22 years has been considered for the estimation of the total



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electricity generation possible in the detailed project report/17/. DNV has evidenced all the above mentioned data.

Furthermore, the generation figure of 216.41 GWh has also been verified from the Techno Economic Appraisal letter dated 23 April 2004 issued by the Central Electricity Authority, Government of India for the Chutak hydro project./31/

However, the annual generation of the project gets reduced to 212.93 GWh due to the consideration of reduced water flow (to maintain the minimum flow for the sustenance of the aquatic life downstream of the proposed barrage) in line with the recommendation in the EIA study of December 2004 /14/, which was after the preparation of the DPR in January 2004. This was also verified from the consents to establish order issued by Jammu and Kashmir pollution control board /10/ and the letter of corporate planning dated 14 June 2005 /29/. During the verification of Environmental Clearance documents, it was also verified that the provision of minimum flow for the sustenance of the aquatic life was reflected in the application submitted by NHPC for Environmental Clearance to the Ministry of Environment and Forests, Government of India and that the necessary clearance was obtained from Ministry of Environment and Forests /11/.

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 construction of barrage two intake tunnels, power canal, four penstock, underground powerhouse, power evacuation system, and tailrace tunnel. The technology reflects current good practices. The life of the project is expected to be around 35 years.

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 February 2011.

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 326 W/m²/17/.

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 project developer has



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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 1:1 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. DNV also confirms that the information used for the calculation of grid emission factor is the latest information that was available at the time of PDD submission.

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.

As per EB 41, Annex 46 proposed project activities with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder Consultation, are required to demonstrate that the CDM was seriously considered in the decision to implement the project activity.

In the context of the above, DNV would like to confirm the following:

- i) The start date of the project activity has been identified as 23 September 2006, which is the date of construction agreement of the project activity. Construction agreement copies provided by NHPC in support of the start date have been verified by DNV/8/.
- ii) That NHPC was aware of the CDM prior to the project activity start date is evident from the fact that the project proponent had started a task force on CDM, (proposal by Executive director (R&D) of NHPC dated 17 October 2005 which clearly mentions four hydro power projects have to be considered for CDM benefits also including the Chutak project /33/.
- iii) The minutes of meeting and email copy sent to the World Bank dated 3 December 2005 by NHPC clearly mentions that there are several hydro projects, including the Chutak project, which can be considered for CDM benefits /34/
- iv) Annex I of the draft Memorandum of understanding (MoU) for the year 2006-07 between Ministry of Power and National Hydroelectric Power Corporation Ltd, dated 8 March 2006 clearly mention under performance parameters, DNA approval for Nimoo-Bazgo and Chutak hydropower projects from December 2006



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to March 2007. This was also cross verified by the MoU signed between NHPC and Government of India on 28 March 2006, clearly mentioning that the DNA approval should be sought for two projects Nimoo-Bazgo and Chutak hydroelectric projects /9/.

- v) The letter submitted by the IDBI bank and CDM consultant MGM dated 24 July 2006 offering the development of CDM projects clearly mention Chutak and other hydro projects for CDM consultancy /35/.
- vi) DNV was able to verify that the project proponent had appointed MGM International as a consultant on 6 March 2007 by issuing the letter of intent (LOI)/36/. Subsequent to the development of the PDD, the project proponent was invited by the DNA of India through a letter dated 18 July 2007 /5/, for a meeting and presentation on 30 July 2007. The validation of the project started with the signing of the agreement between MGM and DNV as DOE on 31 October 2007.

The above chronology of events with supporting documents proves the prior consideration of CDM for the project activity. It can be concluded that the continuing and real actions has been taken in order to achieve CDM status for the project activity in parallel to the implementation of the project activity.

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

Four alternatives to the project activity have been considered.

1. The project activity not undertaken as CDM activity
2. Continuation of the existing scenario (No project activity implementation)
3. Other renewable energy sources like solar, wind and biomass.
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./22/ 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 and the evidences verified, 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 in India according to the memorandum of association /20/23/. 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.



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STEP 2: Investment analysis

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 /24/ for the financial year 2005-2006 (time when the decision to develop the project as CDM project was taken): 10.25%. The project developer has not included any risk premium to this PLR and hence, in DNV's opinion, the selected benchmark is conservative. For this benchmark, project-IRR was considered appropriate as the financial indicator.

The investment cost of the project at INR 621.26 crores was taken from the detailed project report, issued in February 2004. The investment was confirmed from the cost estimate abstract dated November 2006. The project investment cost was also crosschecked with the management approval letters dated 24 August 2006 for 30% equity and 23 November 2006 for the sub-ordinate loan (INR 364 crores) /18/19/. The documents also states that the rest of project funding would be arranged by National Hydro Power Corporation (NHPC) through commercial bank loan. The depreciation charges, return on equity, interest on working capital and operational and maintenance charges were computed based on the Central Electricity Regulatory Commission (CERC) guidelines of 26 March 2004 /26/. The CERC guidelines remain in force in five years or until revised. DNV was able to confirm from the CERC website that there were no updates on the tariff between March 2004 and November 2005. The interest rate on loan has been considered at 8% and is in line with the Rural Electrification Corporation limited applicable for all public sector projects /27/. The electricity generation used in the IRR calculations has been sourced from the salient features reports. The tariff used in the financial calculation has been calculated as stated in the Power Purchase Agreement (PPA) for the proposed project, signed in October 2005 /7/, and should hence be valid at the time of the development of the investment analysis. All the assumptions are considered pertinent at the time of decision. All the input values used in the investment analysis have been validated in line with EB41 Annex 45, paragraph 6. In conclusion, DNV was able to confirm that the input values in the financial analysis were applicable and appropriate at the time of the investment decision.

Furthermore, the IRR spreadsheet has been verified and found correct. The project-IRR over 35 years without CDM has been determined to be 6.5%. DNV is able to confirm that the financial model presented is in accordance with the EBs latest guidance on assessing the financial analysis.

The project developer has carried out the sensitivity analysis also 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. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

If capital cost reduces by 35%, 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 621.26 Crores) is already higher than a normal hydropower plant of similar size (INR 180 Crores /25/). This is mainly because of the



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location of the project in a very remote area at higher altitude. The temperature in the winter season reaches minus 35 degrees Celsius. 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 /39/.

If the electricity tariff increases by 43%, 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 the 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 43% from the original tariff considered for the IRR analysis seems unreasonable

If the electricity generation increases by 40% IRR would increase to 10.25% the benchmark value. 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 40% increase seems unrealistic.

In case on annual O&M costs, even if it falls to zero, the IRR would only increase to 7.96%. O&M cost variation can therefore not cause the IRR to pass the benchmark.

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 techno-economic 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 is based on the total grid generation from hydro projects less than 50 MW in Jammu and Kashmir state and the northern region. 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 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 project activity has been compared with both other run-of-river plants (below 50 MW) in



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Jammu & Kashmir as well as connected to the northern grid of India, and it was found that run-of-river based capacity in Jammu & Kashmir is only 73.55 MW, constituting around 3.17% of the total installed capacity and all these plants were commissioned before 2002. Considering the increasing trends of raw material prices and inflation, a comparison of the project activity with these plants is not deemed appropriate.

The Chutak hydroelectric project is constructed in the remote area of the Kargil district which is at a high altitude of 4 000 meters above sea level. The construction of a hydro project of 44 MW capacity is not a common practice at such a high altitude area in India. Hence, it can be concluded that this project is a distinct project when compared to any other hydro projects in India.

DNV has further evaluated the Hydro projects of capacity in the range of 20-65 MW (i.e. $\pm 50\%$ of the proposed project activity) in the state of Jammu and Kashmir, where the project is located, as well as in the Northern Region to which the project activity is connected, and one plant /28/ was found in this range apart from those which were already considered for common practice analysis. This plant was however built in 1971, and considering the increasing trends of raw material prices and inflation, a comparison of these units with proposed project activity is deemed not appropriate.

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 ACM 0002, version 6, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"/4/. 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. 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 three diesel generators (2X650 KVA, and 1X500 KVA, one stand by) during start up and emergencies. The GHG emissions per year due to operation of diesel generators set were



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observed to be very small and hence were eliminated from the emission reduction calculations. Furthermore, DNV was also able to verify that the power density is 316 W/m^2 /17/ which is greater than 10 W/m^2 . Based on the evidences verified, the project emissions have been considered zero.

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 net electricity generation as 210.38 GWh. The baseline emissions have been estimated to be 1 66 831 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 for global stake holders comments from 31 October 2007 to 29 November 2007. The combined margin emission factor used in the published PDD for emission reduction calculations is 0.76 and was based on the outdated CEA data (Central Electricity Authority website – CO₂ baseline database – version 1.1 dated December 2006 /28/) at the time of PDD publication. During the validation, this was cross-checked and found outdated by DNV. Hence the PP was asked to use the latest data available from the CO₂-database version 02 dated June 2007/28/ vide a clarification request (CL 6). Hence the combined margin was revised from 0.76 in the published PDD to 0.793 tCO₂/MWh in the final PDD submitted for registration. DNV was able to confirm that this was the latest data available at the time of PDD submission for validation in year 2007.

The electricity generation value at 216.14 GWh/year, used in the estimation of the emission reductions is the gross electricity generation figure and was sourced from the detailed project report /17/. The generation figure at 210.380 GWh/year used in the financial calculation is the net electricity generation and has been sourced from the salient features report prepared in 2005/38/ and is the latest document available. The change in generation values is due to the EIA and EMP studies done by university of Jammu and Kashmir, evidenced by the corporate planning division letter dated 14 June 2005 /29/

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

Therefore, in the absence of projects emissions and leakage, the emission reductions resulting from the proposed project activity is equivalent to the baseline emissions i.e. 1 66 831 tCO₂e per year. 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 is consistent with environmental criteria of the Indian Government. An Environmental Impact Assessment (EIA) has been undertaken for the proposed project activity /11/ - /13/.

During the public hearing that was conducted to promote the project, the Chief of Environment of NHPC informed the public about the importance of Environmental studies



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undertaken for this project activity by the Centre for Environmental Education & Training (CEET), University of Jammu. He stressed the importance given to NHPC to conserve the environment in the surroundings of the project area. He informed all care has been taken during the EIA studies to protect the interest of local people as well as the environment /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 populace 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/.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of “1 July 2007 version 01” was made publicly available on DNV’s climate change website (<http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=1559>) 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	OK
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	CL10 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 Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner	CDM Modalities and Procedures §45c,d	OK

Requirement	Reference	Conclusion
and taking into account relevant national and/or sectoral policies and circumstances.		
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 Minji Village of Kargil 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	/1/ /5/	India and The Netherlands are the two Parties participating in the proposed project. India is the hosting the project. National Hydroelectric Power Corporation Limited is		OK

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			the project participant from host party. The Netherlands is the Annex I Party identified for the proposed project. 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	/1/ /5/	Letter of approval from DNA of India dated 10 August 2007 has been verified. However, the project developer needs to provide the letter of approval (LoA) from DNA of Netherlands. The Netherlands name is removed in the revised version of PDD, hence it is not required.	CAR1	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	/1/ /5/	Yes, India and The Netherlands fulfil the requirements for participating in a CDM project activity. Both Parties have ratified the Kyoto Protocol and have established the designated national authority. The Designated National Authority (DNA) of India is The Ministry of Environmental and Forests, Government of India. India ratified the Kyoto Protocol on 22 August 2002. The Designated National Authority of The Netherlands is Ministry of Housing, Spatial Planning and the Environment. Netherlands ratified the Kyoto Protocol on 31 st May 2002.		OK
A.2.4. Potential public funding for the project from	DR/I	/1/	No public funding from any Annex-1		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Parties in Annex I shall not be a diversion of official development assistance.			countries is available for the project activity.		
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	/1/ /6/	Yes, the project includes installation of four vertical shaft Francis turbine with the rated output of 11MW each, with an efficiency of 91.25%. The other structures comprise of barrage, 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	/1/ /6/	Yes. The technology used for the project is available in the host country and is of state of the art. The purchase order copy and claim for the technology needs to be provided for verification. The Purchase order placed on BHEL was verified.	CL1	OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	DR	/1/	The training needs for the project activity needs to be addressed in the PDD.	CL2	OK

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			This is addressed in the revised version 02 of PDD.		
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	/1 /5//	Letter of Approval from DNA of India 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, the project is expected to improve basic living condition and educational standard of the region. The implementation of the project activity will result in the 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>					
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/	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.		

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	DR		<p>Yes, the project activity meets the applicability criteria of ACM0002 and is justified as under :</p> <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 326 W/m². • The geographic and system boundaries for the relevant electricity grid have been clearly identified to be the northern regional electricity grid. • The project activity doesn't involve switching from fossil fuels to renewable energy at the project site. <p>The project activity will displace fossil fuel based electricity that would have otherwise been provided by the operation and expansion of the grid.</p> <p>The project developer is requested to demonstrate the power density of the project activity (along with the documentary evidence)</p> <p>The power density was verified by hard copy of the DPR.</p>	CL3	OK
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</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>has been followed in a complete and transparent manner.</i>					
B.2.1. What is the baseline scenario?	DR	/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/I	/1/ /4/	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/	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 the project times the grid emission factor of the connected grid calculated as per the guidelines provided.		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	DR	/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,	DR	/1/	Yes. All relevant national and sectoral policies, regulations and department rules		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
macro-economic trends and political aspirations?			and disciplines are considered.		
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. This is clear in the revised version of PDD All the sources, references need to be provided for verification. The reference documents were verified by DNV.	CL3	OK
B.2.7. Have the major risks to the baseline been identified?	DR	/1/	The baseline scenario has been determined using conservative assumptions.		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/ /6/ /7/ /8/ /9/ /16/ /17/ /18/	<i>Additionality has been demonstrated in accordance with the “Tool for demonstration & assessment of additionality (ver-4)”-</i> <u>Step 1a: Identification & justification of plausible alternative:</u> The implementation of the proposed project activity without CDM & continuation of current practice has been discussed for electricity generation. <u>Step 1b:</u> Since implementation of the proposed project activity faces investment	CL4	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>and common practice barriers, continuation of current situation is considered as baseline scenario and is consistent with current laws and regulations.</p> <p><u>Step 2: Investment analysis:</u></p> <p>To demonstrate the additionality of the project proponent have chosen Option II – Investment comparison analysis. The levelized cost of electricity production of electricity and IRR of the project are chosen as financial indicators. The CEA study reports on the levelized cost of various fuel based projects have been provided for investment comparison analysis.</p> <ul style="list-style-type: none">• The levelized cost of electricity production of electricity for hydro power project have been derived to be -0.11\$/KWh which is quite higher in comparison to levelized cost of production of electricity from CCGT at 0.06286 \$/KWh, Coal at 0.03205 \$/KWh and Oil at 0.04214 \$/KWh.• It has been stated that the IRR of the project activity without CDM revenues is 6.5 % which is lower than the expected IRR from Private sector Investment on infrastructure projects		

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			<p>of 14 -16%.</p> <ul style="list-style-type: none">• A sensitivity analysis has also been performed with $\pm 10\%$ change in project investment, project revenue and O&M costs. And have shown that the IRR is less than 14-16%. <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 risk premium, which is conservative. The PP has worked out project IRR and it was found to be 6.5% without CDM revenues.</p> <p><u>Step – 3 – Barrier Analysis: Not considered for analysis.</u></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 generation adds up to 74% of the total grid generation. However, the project developer is requested to provide an evidence for this</p>		

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			<p>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 version 02 of PDD</p> <p>The project developer is also requested to provide the clarification for the following points:</p> <ul style="list-style-type: none">• The project developer needs to provide a justification for not considering the alternative of electricity generation from other renewable sources like wind, solar and biomass.• Furthermore, in investment analysis, the project developer has considered Option II – Investment comparison analysis for the demonstration of investment barrier. However, investment		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			comparison analysis has not been done in accordance with the “Tools for the demonstration and assessment of additionality. The project 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		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>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.• 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 new and renewable energy, 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.		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> • Proof for PLF considered. <p>All the above mentioned documents were provided for verification and the issues are addressed in the revised version 02 of PDD</p>		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	DR	/1/	Additional evidences as stated in above section are to be provided.	CL4	OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	DR	/1/	Additional evidences as stated in above section are to be provided	CL4	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>The starting date of the project as per the PDD is 1 February 2011(date of commissioning).</p> <p>However, in accordance with the EB's latest guidelines regarding the project 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. 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. The CDM</p>	CL5	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			consideration letter was verified by DNV.		
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?	D/IR	/1/	<p>Since the project activity involves generation of electricity using hydro resources, no project emissions are envisaged.</p> <p>It is to be clarified if the project activity uses any fossil fuel based power generation for emergencies/startup. It is mentioned in the revised version 02 of PDD, two Nos of 630KVA and one 500KVA diesel generators will be used in case of emergencies</p>	CL6	OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	DR	/1/	Refer to B.4.1.	CL6	OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	DR	/1/	Refer to B.4.1.	CL6	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</i>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	DR	/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 44 MW and the plant is expected to export an average of 216.41 GWh electricity to the Northern Regional Grid per year. Emission reduction calculation excel sheet needs to be provided. The ER calculations sheet was verified.	CL6	OK
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	DR	/1/ /4/	same as B.5.1	CL6	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	DR/I	/1/	Same as B.5.1	CL6	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 – where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented	DR	/1/	No leakage effect needs be accounted under		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
according to the approved methodology and in a complete and transparent manner?		/4/	this methodology ACM0002		
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	/1/	The project activity on implementation as stated is expected to result in emission reduction of 1 71 456 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	/1/ /4/	Yes, the monitoring plan documented according to the approved Consolidated methodology ACM0002 is complete and transparent.		OK
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,	DR	/1/	This needs to be addressed in the PDD. The revised version 02 of PDD address that, the data will be archived for two years after	CL7	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
for this project activity, whichever occurs later?			the end of crediting period.		
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. This is addressed in the revised version 02 of PDD. 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.	CL6	OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	DR	/1/	Refer to B.9.1	CL6	OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	DR	/1/	Refer to B.9.1	CL6	OK
B.9.4. Is the measurement equipment described and deemed appropriate?	DR	/1/	Refer to B.9.1	CL6	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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	CL6	OK
B.9.6. Is the measurement <i>interval</i> identified and deemed appropriate?	DR	/1/	Refer to B.9.1	CL6	OK
B.9.7. Is the <i>registration, monitoring, measurement</i> and <i>reporting</i> procedure defined?	DR	/1/	Refer to B.9.1	CL6	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	CL6	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	CL6	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>					
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	/1/	Yes, the monitoring plan provides for the collection and archiving of all the relevant data necessary for the estimation of the GHG emissions over the entire renewable crediting period.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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 of the monitoring equipments need to be furnished. Digital meters will be installed to measure the electrical energy generated.	CL8	OK
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%		
B.10.6.Is the measurement <i>interval</i> for baseline data	DR	/1/	Yes,		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
identified and deemed appropriate?					
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. The calibration intervals shall follow the national standards and rules.	CL2	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/I	/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.	CL7	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 necessary for determining leakage?	DR	/1/ /4/	No leakage effect needs be accounted under this Methodology ACM0002.		OK
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	DR	/1/ /4/	Refer to B.11.1		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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	/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/	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	/1/	same as B.12.1		OK
B.13. Project Management Planning <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	/1/	Yes, The authority and responsibility of the project management has been identified in		

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the PDD. Chief Engineer CDM will be responsible for overall project management.		
B.13.2. Are procedures identified for training of monitoring personnel?	DR	/1/	Procedures for training of monitoring personnel need to be formulated. This has been addressed in the revised version 02 of PDD	CL2	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	DR/I	/1/	As the project activity is a hydropower project, no emergencies are foreseen which can cause unintended emissions.		OK
B.13.4. Are procedures identified for review of reported results/data?	DR/I	/1/	Procedure for review of reported results need to be formulated. The revised PDD address these issues.	CL7	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	DR/I	/1/	Procedures for corrective actions need to be formulated. The revised PDD address these issues.	CL7	OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
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 February 2011(date of commissioning), while it's operational lifetime is expected to be 35 years. The project developer is requested to change the project starting date accordingly. The	CL5	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>start date is revised to construction agreement signed date 23 Sept 2006 in the revised version 02 of the PDD</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>CDM consideration letter dated 28 March 2006 was verified.</p>		
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 February 2011.		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>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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	<p>Yes. The project participant has done an EIA. The analysis of the environmental impacts of the project is described sufficiently in the PDD.</p> <ul style="list-style-type: none"> • Copy of EIA need to be provided for validation. • Consents to establish from State pollution control board to be furnished. • 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>	CL9	OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	DR	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. 	CL9	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			All the above documents were furnished for verification.		
D.1.3. Will the project create any adverse environmental effects?	DR/I	/1/ /14/	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		OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	DR	/1/ /14/	Yes,		OK
D.1.5. Have identified environmental impacts been addressed in the project design?	DR	/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	/1/ /10/ /11/ /12/ /13/ /14/	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.	CL9	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	/1/	It has been reported that the stakeholder have	CL10	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	/I	/15/	been consulted on 30 th August 2005. Local stakeholders, representatives of the State pollution Control board representatives of CEET, University of Jammu & NGOs have been consulted. However evidence regarding stakeholder's consultation & minutes of meeting needs to be provided apart from Environmental Public Hearing. Minutes of meeting signed copies by local stakeholders were verified by DNV.		
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	DR/I	/1/ /15/	An Environmental Public Hearing Meeting was performed at village Sarzhe, Distt. Kargil on 30 August 2005. However evidence regarding stakeholder's consultation & minutes of meeting needs to be provided apart from Environmental Public Hearing. Local newspapers published inviting the stakeholders were verified by DNV.	CL10	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.		OK
E.1.4 Is a summary of the stakeholder comments received provided?	DR	/1/	Yes,		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E.1.5Has due account been taken of any stakeholder comments received?	DR	/1/	Yes,		OK

* MoV = Means of Verification, DR= Document Review, I= Interview
CDM Validation2007-1990, rev.02

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
CAR.1 The Letter of Approval from DNA of Netherlands 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 02 of PDD, hence the letter of approval from Netherlands is not required. CAR is Closed.
CAR 2 In 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 35% reduction in the capital cost or electricity sale rate / tariff was 43 % higher, the IRR would reach the bench mark of 10.25%. Since, 35% decrease in investment is not possible due to the project location and increase in 43% 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 7.96%, still below the benchmark considered. This is in accordance with EB 39 guidelines. CAR 2 is closed.

CL 1. The purchase order copy and claim for the technology needs to be provided for verification.	A.3.2	See file “ <i>Contract for Chutak Project Extract for capacity_CL1</i> ” in folder “ <i>CL_additional_files</i> ”. <i>The capacity is 4x11MW: four turbines of 11MW each, adding up 44MW of installed capacity (Section A.4.3 of PDD)</i>	Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 16/08/2007 was verified with detailed technical specification and technology used. CL 1 closed.
CL2 The training needs for the project activity needs to be addressed in the PDD.	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 and 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.
CL3 The power density of the project activity needs to be demonstrated with proof	B.1.2 B.2.6	See file “ <i>Chutak_Power density_CL3</i> ” in folder “ <i>CL_additional_files</i> ” <i>Note in figure-III on page 3 of attached document that area curve and capacity curve intersect at 13.5 ha area at an elevation of 2781 m. The tail water elevation is 2717.60 (see page 2), so that turbine head is 63.4 m. This corresponds to the specifications of the turbine, also shown in page 2, where we can see that output power is 44 MW.</i>	In the DPR, it was verified that the total catchments area is 3488 Sq Km. Power density is justified to be 316 W/m2 based on DPR extract. CL 3 Closed
CL4: <u>Clarification regarding common practice analysis:</u> It is stated in the PDD that the net generation from the small hydro power plants	B.3.1 B.3.2 B.3.3	<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</i>	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>(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 upto 74% of the total grid generation. However, the project developer is requested to provide an evidence for this statistics.</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.</p> <p>- The project developer is also requested to provide the clarification for the following points:</p> <ul style="list-style-type: none"> • The project developer needs to provide a justification for not considering the alternative of electricity generation from other renewable sources like wind, solar and biomass. 		<p><i>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: other renewable energy sources..." It is shown that wind, solar and biomass are not viable alternatives to the project.</i></p>	<p>and the generation from hydro power plants of capacities less than 50MW in the project region is only 1.6%</p> <p>This is removed in the revised version 02 of the PDD.</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. - Based on the discussion, DNV is able to conclude that setting up of a 44 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</p>
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<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 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 		<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>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 mark considered is 10.25%, without considering market risk premium as the PP is a government agency which is conservative</p>
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<p>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 “Contract for Chutak Project Extract for capacity_CL1” in folder “CL_additional_files”</i></p> <p><i>PLF: See extract of Detailed Project Report for Chutak 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 Chutak can be found in page 2 of the attached</i></p>	<p>Purchase order copy of equipment placed on Bharat Heavy Electricals Ltd, Delhi dated 16/08/2007 was verified.</p> <p>PLF has been verified to be 57% based on 91% machine availability from detailed project report.</p>
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<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 New and Renewable Energy, small hydro power plants include power plants up to 25 MW. The same needs to be clarified. • Loan sanction letter to the furnished. <p>- Management letter to Ministry of Power for approval of finance to be furnished along with Supporting documents for project cost.</p>		<p><i>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> <p><i>Approval letter is furnished to DNV with supporting documents</i></p>	<p>Based on the CEA website data, DNV was able to verify that power plants with capacity less than 50MW plants is not a common practice in the northern region of India. The revised PDD 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> <p>Hard copy of Loan sanction letter was verified by DNV</p> <p>It has been confirmed that the proposed project will receive 30% as equity ie.; INR 186.38 crores, INR 364 crores as sub ordinate loan from Govt of India and remaining INR 70.86 crores will be commercial loan from LIC of India</p>
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<ul style="list-style-type: none"> • Detailed project report needs to be provided. • Power Purchase Agreement needs to be furnished. 		<p><i>Copy of DPR was furnished to DNV during site visit.</i></p> <p><i>Power Purchase Agreement has been provided to DNV India auditors.</i></p>	<p>Copy of letter from NHPC & Ministry of power for financial approval– 24 August 2006 and</p> <p>Copy of letter from NHPC & Ministry of power for Subordinate loan – 23 November 2006 was verified by DNV.</p> <p>It was confirmed that the total project cost is INR 621.26 crores</p> <p>Hard copy of Detailed Project report was verified by DNV.</p> <p>The submerged area due to the implementation of project activity was verified and based on this the power density was calculated to be 326 W/m². The same has been verified from the detailed project report. DNV also verified the plant load factor of 57%</p> <p>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 44 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>
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			CL 4 closed
<p>CL5</p> <p>The project developer is requested to change the project starting date accordingly.</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>Proof for CDM consideration to be furnished.</p>	<p>B.3.4</p> <p>C.1.1</p>	<p><i>Government approval date was 24-8-06 (See file “Chutak 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 was verified by DNV.</p> <p>CL 5 closed.</p>
<p>CL6</p> <ul style="list-style-type: none"> Clarify if the project activity uses any fossil fuel for emergency power generation. 	<p>B.4.1</p> <p>B.4.2</p> <p>B.4.3</p> <p>B.9.1</p>	<p><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</i></p>	<p>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</p>

¹ Tan Delta testing enables the cable test engineer to detect insulation defects.

<ul style="list-style-type: none"> Emission Reduction Calculation Excel sheet needs to be provided for verification. .Procedures for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation need to be formalized. Procedures for maintenance of monitoring equipment and installation and calibration intervals need to be included in PDD. Procedures for registration, monitoring, measurement and reporting need to be formalized. Measurement equipments and accuracy procedures to deal with 	<p>B.92 B.9.3 B.9.4 B.9.5 B.9.6 B.9.7 B.9.8 B.9.9</p>	<p><i>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: 2X630KVA at Power house (one main and one standby) and 1X500KVA at Barrage. (See Section A.4.3 of PDD)</i></p> <p><i>Emission Reductions calculation spreadsheet attached: "Chutak PDD_exante_ER_270507.xls"</i></p> <p><i>See Section B.7.2 where the following is included:</i></p> <p><i>Monitoring activities that complement the Maintenance Plan):</i> <i>Monitoring tests like Partial Discharge of generators, Dissolved Gas Analysis of Transformer oil, Insulation Resistance, capacitance, tan delta tests¹, and many others are also done to complement the monitoring. Procedures for regular testing and calibration of gauges, panel relays, relays, meters and other instruments are also defined to ensure proper working. The frequency for calibration and other tests are defined as per need following national standards and rules.</i></p>	<p>emissions will be negligible. Hence not considered.</p> <p>ER calculation sheet was verified.</p> <p>The procedure for maintenance, monitoring equipments, calibration, day to day record handling and reporting is addressed in the revised version 02 of PDD.</p>
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<p>erroneous measurements need to be formalized.</p>	<p><i>Staff Training that complements the Monitoring Plan and Maintenance Plan:</i> <i>Staff training for proficiency in use of the monitoring instruments is taken care of by the power station management. The HRD cell also conducts training regularly to enhance the skills of personnel attached with such equipment in the operating stations.</i> <i>The EPC contract includes the supply of the operation and maintenance manuals by the contractor with drawings of the facilities as built. This shall be in such detail as to enable NHPC to operate, maintain, adjust and repair all parts of the facility.</i> <i>For Chutak specific plans and documents will be available at the time of commissioning of the plant.</i> <i>Data and Information Management of the plant:</i> <i>A system shall be provided at central control room that shall be equipped with storage media for real time data storage. The data logger shall be provided to receive, update, print out and show on the VDU's all signals, events, alarms, status, status change, abnormalities and history data of plant and ambient conditions either periodically, on request or immediately</i></p>	
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		<p><i>in case of alarm.</i></p> <p><i>Redundant Network Attached Storage (NAS) systems of high performance and high capacity to store the plant history data up to the power plant's lifetime shall be provided. The information stored by these storage appliances shall also be available on-line with automatic "hot" backup of on-line data and ready to be shared by servers on the Central Control Room Network and associated LAN. The NAS devices shall have open system architecture to connect them to other equipments. This centralized data storage system shall also use fast read/write optical backup medium such as re-writable CD-RW media using CD writers or high performance tape drives. Storage media is provided for 20 years of storage.</i></p> <p><i>Database Management System based on latest available version of ORACLE RDBMS database software shall be provided.</i></p> <p><i>High reliability of communication shall be realized by double bus (redundant) system. The two systems shall continuously operate separately and only in case of traffic interruption on one bus, the other shall take over the traffic</i></p>	<p>The revised PDD version 03 dated 12</p>
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Latest CEA data to be used for calculations		<i>. This is addressed in the revised PDD</i>	May 2008 includes the latest 2005-2006 CEA data for calculations. CL 6 closed.
CL7 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 CERs, whichever occurs later. (See Section B.7.1 of PDD). Additional information is addressed in the monitoring plan presented in the PDD.</i>	The data will be archived for 2 years after the crediting period. This is addressed in the revised version 02 of PDD. CL 7 closed.
CL8 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 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>	Digital meters of 0.2% accuracy will be used for measurement of electricity. This is addressed in the revised version 02 of PDD. CL 8 closed.
CL 9 <ul style="list-style-type: none"> Consents to establish from State pollution control board to be furnished. 	D.1.1 D.1.2 D.1.6	<i>All these documents have been sent to DNV India.</i>	➤ Consents to Establish dated 11 September 2007 by Jammu & Kashmir state pollution control board was verified by DNV.

<ul style="list-style-type: none"> • Copy of EIA need to be provided for validation. 			<ul style="list-style-type: none"> ➤ Environmental Clearance letter dated 17 November 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 9 closed.</p>
<p>CL10 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.</p>	<p>E 1.1 E.1.2 E.1.3</p>	<p><i>All these documents have been sent to DNV India.</i></p>	<p>The stakeholders were invited by two local newspapers “Daily Excelsior dated 1 Nov 2004 and Greater Kashmir dated 30 Nov 2004” Minutes of meeting signed copies by the local stakeholders were verified by DNV. CL 10 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-CDMJI-i1

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

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-CDMJI-i1)

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

ACM002, AMS-IA-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-IA-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