Voluntary Carbon Standard 2007.1
Validation Report

No: 8106163979 -10/033

Validation Report:

Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2010-02-23
Report Title:	Approved by:
Teesta-V Hydro Power project in Sikkim by NHPC Limited, India	Rainer Winter
Client:	Project Title:
National Hydroelectric Power Corporation Limited	Teesta-V Hydro Power project in Sikkim by NHPC Limited, India
Summary:	

National Hydroelectric Power Corporation Limited has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: " Teesta-V Hydro Power project in Sikkim by NHPC Limited, India" with regard to the relevant requirements of the VCS, as well as criteria for consistent project operations, monitoring and reporting.

The project intends to generate electricity by exploiting the hydro energy potential of the river Teesta in the state Sikkim of India. The project comprises installation of three power generation units of capacity 170 MW each aggregating a total installed capacity of 510 MW.This renewable energy project is based on the run-of-river scheem and consists of a concrete gravity dam across the river Teesta. Annual enrergy to be produced from the project activity has been estimated to be approx. 2572.67 million units of electricity considering a PLF of 56.7 %. The generated electricity will be exported to the NEWNE grid of India out of which 12% will be credited to Sikkim state government as free power. The project started generating commercial power since 01st March 2008

The review of the VCS PD/PD01/PD02/ and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 16 Corrective Action Requests (CAR) and 05 Clarification Requests (CR) were raised and successfully closed out.

The validation is based on the VCS PD/PD01/PD02/, proof of title/MoPA/TEC/, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validates by project proponent.

As a result of the validation, the validates confirm that:

- The project fulfils criteria of VCS 2007.1 provided.
- The project additionality is sufficiently justified in the PD/PD02/.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM 0002, version-10.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 20444420 t CO_2e (total) is most likely to be achieved within the 10 years renewable crediting period which will be renewed twice.
- No restrictions or uncertainties were identified related to the validation.

Work carried out by:	Number of pages:
Mr. Pankaj Patel Mr. Hemang Shah Mr. Saroj Sahoo	30

[Table of Content]

1 Introduction 3
1.1 Objective 3
1.2 Scope and Criteria 3
1.3 VCS project Description 4
1.4 Level of assurance 4
2 Methodology 5
2.1 Review of Document 5
2.2 Follow-up Interviews 5
2.3 Resolution of any material discrepancy 6
3 Validation Findings 7
3.1 Project Design 7
3.2 Baseline 10
3.3 Monitoring Plan 22
3.4 Calculation of GHG Emissions 24
3.5 Environmental Impact 25
3.6 Comments by stakeholders 25
4 Validation conclusion 26

1 Introduction

1.1 Objective

The purpose of this validation is to have an independent third party assess the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with

- The requirements of VCS 2007.1 program guidelines
- Requirements of the Approved methodology, ACM 0002 Version 10, EB 47
- To assess the project's compliance with other relevant rules, including the host country (India) legislation;
- Other relevant rules, of VCS sustainability criteria are validated in order to confirm that the project design as documented is sound and reasonable and meet the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of Verified emission reductions (VERs).

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan which are included in the PD/PD02/ and other relevant supporting documents.

The items covered in the validation are described below:

- **VCS 2007.1 & Host Country Criteria**

  - All relevant VCS 2007.1 requirements
  - Host Country requirement / criteria
- **VCS Project Description /PD/**
  - Project design
  - Project boundaries
  - Predicted project GHG emissions
- **Project Baseline**
  - Baseline methodology
  - Baseline GHG emissions
- **Project Additionality**
- **Monitoring Plan**
  - Monitoring methodology
  - Indicators/data to be monitored and reported
  - Responsibilities
- **Background investigation and follow up interviews**
- **Stakeholder Consultation**
  - Review of comments
- **Draft validation reporting with CARs & CRs, if any**
- **Final validation reporting.**

The information included in the VCS PD/PD01/PD02/ and the supporting documents were reviewed against the requirements and criteria mentioned above. The TÜV NORD JI/CDM CP has, based on the recommendations in the Validation and Verification Manual/VVM/, employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of VERs. The validation is based on the information made available to TÜV NORD JI/CDM CP and on the contract conditions.

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

1.3 VCS project Description

The project intends to generate electricity by exploiting the hydro energy potential of the river Teesta in the state Sikkim of India. The project comprises installation of three power generation units of capacity 170 MW each aggregating a total installed capacity of 510 MW. This renewable energy project is based on the run-of-river scheme and consists of a concrete gravity dam across the river Teesta. Annual energy to be produced from the project activity has been estimated to be approx. 2572.67 million units of electricity considering a PLF of 56.7 %. The generated electricity is exported to the NEWNE grid of India out of which 12% will be credited to Sikkim state government as free power. The project started generating commercial power since 01st March 2008

1.4 Level of assurance

The validation report is based on VCS PD/PD01/PD02/, ER calculation sheet/XLS1/XLS2/, supporting documents made available to the validator and information collected through per-

forming interviews and during the on-site assessment. The validation opinion is assured provided the credibility of all above.

2 Methodology

The validation of the project was carried out in October 2009 to February 2010.

Preparations	:	2009-10-01 to 2009-10-15
On-site validation	:	2009-11-12
(Draft) Reporting	:	2009-11-13
(Final) Reporting	:	2010-02-23

The validation consisted of the following three phases:

- a desk review of the project design and the baseline and monitoring methodology
- follow-up interviews
- the resolution of outstanding issues and the issuance of the final validation report and opinion

2.1 Review of Document

.

Furthermore, the validation team used additional documentation by third parties like host party legislation, technical literature referring to the project design or to the basic conditions and technical data.

The documents that were considered during the validation process are given in chapter 5 of this report. They are listed as follows:

- Documents provided by the project proponent (Table 5.1)
- Background investigation and assessment documents (Table 5.2)
- Websites used (Table 5.3).

2.2 Follow-up Interviews

On 2009/11/12 , the TÜV NORD JI/CDM CP performed Pre validation visit with the project proponent. During this visit, as well as earlier and after, interviews with the project proponent, the consultant, project stakeholders and with local authorities had been carried out to confirm selected information and to resolve issues identified in the document review.

The key interviewee and main topics of the interviews are summarised in Table 2-1.

Table 2.1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives /IM01/ Consultants /IM02/	- Chronological description of Project - Technical details of the project realisation – specification, engineering, operational life time - Equipment Performance data - Monitoring and measurement equipment - Project activity starting date/ commissioning date - Crediting period - VER allocation /ownership - Baseline study assumptions - Sustainable development issues - Analysis of Environmental Impact - Analysis of local stake holder consultation - Roles & responsibilities, competency and training of the staff members w.r.t project management, monitoring and reporting - Operational Data - technical specification, capacity, estimated life time of the project plant units - Editorial aspects of PD - Procedural aspects - Debundling aspects - Base line study, project emissions, leakage and additionality - Details of emission reduction calculation

The detailed list including the functions or designations of the interviewed persons is given in chapter 5.

2.3 Resolution of any material discrepancy

During the validation of the project some discrepancies were observed and communicated to the project proponent in the form of CARs/CRs. Necessary corrections were made in the VCS PD and corresponding documents to address the CARs/CRs

After reviewing the revised and resubmitted project documentation /PD02/; resolving the CARs & CRs raised and outstanding concerns, TÜV NORD JI/CDM CP issues this final validation report and opinion.

In this validation 16 CARs and 06 CRs were raised. The CARs / CRs are documented in the validation report and summerised in table 2.2 below.

Table 2-2: Summary of CAR and CR issued

Validation topic 1)	No. of CAR	No. of CR
General description of project activity (3.1)	02	-

Validation topic [1)]	No. of CAR	No. of CR
- Project boundaries - Participation requirements - Technology to be employed - Contribution to sustainable development		
Project baseline (3.2) - Baseline Methodology - Baseline scenario determination - Additionality determination	11	05
Monitoring plan (3.3) - Monitoring Methodology - Monitoring of Project emissions Baseline emissions Leakage Sustainable development indicators / environmental impacts Project management planning	01	-
Emission Reduction Calculations (3.4) - Calculation of GHG emission reductions Project emissions Baseline emissions Leakage - Emission reductions	01	-
Environmental impacts (3.5)	-	-
Stakeholder Comments (3.6)	01	-
SUM	**16**	**05**

1) The letters in brackets refer to the validation protocol

For an in depth analysis/evaluation of all CARs and CRs can be referred to the below sections from 3.1 to 3.6.

3 Validation Findings

3.1 Project Design

The project activity involves setting up a 510 MW hydro electric power project and harnessing renewable power from the stream of the natural water flow of the run-of river ROR).The electricity produced would be supplied to the regional grid namely NEWNE Grid of India. The details of the project activity are shown the table below. Technical details of the project activity are cross checked with the techno economic clearance issued by Central Electricity Authority.

Table 3.1 : Details of the project activity

Parameter	Value
Hydrology	
Catchment Area	4307 sq. km
Design Discharge	9500 cumecs
Diversion Tunnels	
No.	2
Lengths	410 m and 550 m
Power House (Francis)	
Type	Underground
Design Discharge – 3 units	292.37 cumces
Installed Capacity	510 MW
Gross Head	216.73 m
Net Head	197.57 m

The project duration is 35 years.

Project start date is 01/03/2008 – commissioning date of the unit 2.

Crediting period is 10 years renewable crediting period.

Validation team has reviewed the commissioning certificate/CC/ Eastern region power committee and tariff order by CERC and confirmed that the unit no 2 was started on trial run on 25/02/2008 and commercial operation start date is declared on on 01/03/2008. Thus this has been considered as the start date of the project. The crediting period start date is 01/04/2008.

From the documents provided by the project proponent including the loan agreement/LA/, Power Purchase Agreement (PPA/PPA/), Commissioning Certificate/CC/ and Statutory Clearance/SC/ it was verified that the ownership of the proposed project activity belongs to National Hydroelectric Power corporation limited.

As the project start date of the project activity is 01/03/2008 and validation activity is started within two years from the start date it was found that the proposed project activity is eligible under VCS as per VCS Program guidelines Clause no 5.2.1 of VCS 2007.1.

Based on the independent review of details available in public domain for the project activity under various GHG programme by validation team and by review of the declaration given by the project proponent/DEC/ it is evident that the emission reduction was not double counted and as the project has not applied for carbon benefits under any other GHG programme nor there is no rejection history for the project activity.

As the annual emission reduction due to implementation of the project activity is more than 1,000,000 tonnes CO2 equivalent project is falling under Mega project as per the VCS guidelines.

As verified during the site visit and by conducting document review, validation team confirmed that the project activity is implemented as per the description provided in the VCS PD.

Nevertheless CAR 1.1 to CAR 1.2 were raised during the course of validation and were successfully closed. The same has been listed out in the following table.

CAR/CR	Reference	**Summary of project owner response**	**Revised sections (as applicable)**	**Conclusion**
CAR 1.1 The project boundary of the project activity should be specified in respective section of the VCS PD.	/VCS PD/	The project boundary is included under section 1.8 of the VCS PD.	/VCS PD/ /Section 1.8/	The project boundary has been defined in the revised VCS PD. CAR is closed
CAR 1.2 The criteria related to power density of the project activity specified vide page-3 last paragraph of the methodology ACM 0002 needs to be demonstrated.	/ACM 0002/	The criteria are demonstrated under section 3.2 of the monitoring plan.	/VCS PD/ /Section 3.2/	The criteria have been demonstrated in the revised VCS PD/PD02/. The power density has been calculated to be 752.7 W/m2 which is more than 10 W/m^2.Thus the project fulfills the criteria specified in the methodology. OK CAR is closed.

3.2 Baseline

The selected baseline methodology is the approved baseline methodology "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM 0002: Version 10: EB 47).

The project satisfies all applicability criteria for ACM 0002 version 10. The information given in the section 2.2 of the VCS PD/PD01/PD02/ were reviewed by the validation team and has been assessed as correct based on the Power Purchase agreement/PPA/, Loan agreement/LA/ gathered during site visit and the review of commissioning certificate/CC/ and technical specification/TS/ submitted to the DOE. Thus the DOE conclude that the project does not involve the addition of renewable energy generation units at an existing renewable power generation facility nor does the project activity involves retrofitting or modification of exiting facility for renewable energy generation.

The selected baseline methodology, i.e., ACM 0002 version 10 is correctly applied to this type of grid connected renewable generation project. There is no methodology deviation or revision.

As per the approved methodology ACM 0002 V 10, baseline is the Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Project proponent has selected option (a) of paragraph 9 i.e. A combined margin (CM), consisting of the combination of simple operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system' for calculating emission factor.

The resultant combined margin figure of 0.803 tCO_2/MWh worked out on the basis of data according to CO_2 Baseline Database (Version – 4.0)/CEA/ published by CEA of India and the default weight factors of W_{OM}=50% and W_{BM}=50% is deemed as correct, transperent and conservative. The following table shows the ex-ante emission factor (Simple OM and BM) chosen for the project activity which would be remain fixed through out the entire crediting period.

Build Margin		**Simple Operating Margin**	
Year	**tCO_2/MWh**	**Year**	**tCO_2/MWh**
2007-08	**0.597**	2005-06	1.02
		2006-07	1.01
		2007-08	1.00
		Weighted Average OM	**1.008**

The above data has been verified from the database of Central Electricity Authority (CEA) version 4.0/cea/.

Nevertheless, CARs (2.1-2.2) had been raised and successfully closed. The list of the CARs and the CRs is as follows.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 2.1 Though it is not conservative, 12% of net power credited to the Sikkim state Government may be ignored for calculation of ex-ante emission reduction of the project activity.	/PD 01/ /Section-1.3,3.2,4.2/	The royalty of 12% power to state has been excluded for the calculation of the emission reductions.	/PD 02/ /Section-1.3,3.2,4.2/	The 12% of the free power to the state has been ignored for the ex-ante emission reduction calculation in the revised VCS PD. This is assessed as correct as emission reduction is actually taking place on total net electricity exported to the grid. However in financial calculation the revenue has been considered after deduction of 12% free power to the state. As a result the ER has increased from 18045316 to 20444420 as presented in initial VCS PD CAR is closed.
CAR 2.2 The operating margin emission factor chosen for the calculation of baseline emission should be the genera-	/PD 01/ /Section-2.4/	The operating margin is corrected and computed on the generation weighted average	/PD 02/ /Section-2.4/	Generation weighted average Operating Margin emission factor is now consid-

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
tion weighted average of last 3 years' operating margin emission factor. (page-13, VCS PD)		of last 3 years of the operating margin data.		ered. CAR is closed.

ADDITIONALITY:

Demonstration of additionality:

The additionality was demonstrated in PD as per the section 5.8, of the VCS 2007.1./VCS/ The PP had chosen Test 1 (the Project Test) to prove additionality. Under step 1 of the project test it has been assured that the project has not been undertaken to meet any national or local regulatory requirements. The same was checked by studying the orders and regulations of national and state ministries, about any mandates regarding hydro projects.

Under step 2 (implementation barrier), investment barrier have been chosen to argue additionality. DOE has done thorough check of the documents submitted to cross check each claim of additionality. Interviews also were conducted to ascertain this.

Step 3, common practice analysis has been found to be in line with chapter 7 of guidance on GHG protocol for project accounting. The demonstration of common practice has been found to be acceptable.

Table 3.2: Additionality assessment

Step # / Barrier	Demonstration	Assessment
Step 1: Regulatory Surplus	Project is not implemented to meet any applicable local and national regulatory requirements. Same is confirmed by conducting document review/FC/MoPA/PCB/PPA/TEC/.	☐ Argument not justified ☐ Argument not convincing ☐ Argument justified but not a decisive barrier ☒ Argument justified / significant barrier
Step 2: Implementation barrier	Investment barrier : The validation team is convinced that the project faces Investment barrier. PP has chosen project IRR as financial indicator and local commercial lending rate as the benchmark to demonstrate the addi-	☐ Argument not justified ☐ Argument not convincing ☐ Argument justified but not a decisive barrier

Step # / Barrier	Demonstration	Assessment
	tionality. Additionality Tool read with Annex 58 of EB 51 permits the use of project IRR as financial indicator and use of commercial lending rate as the benchmark. PP has chosen the local commercial lending rate as the benchmark for the project activity. PP has taken lending rates published by the reserve Bank of India for the month of February 1999 at the time of decision making. Validation team has verified the website of the reserve bank of India and convinced that the benchmark of 12.75 % selected by PP as appropriate for the project. This is also in line with the para 12 of the Annex 58 of EB 51. The three important parameters, which determine the project IRR of the project, are project cost, financing pattern, and profitability estimates. The project cost includes land, buildings, generating plant and machinery, transmission lines, switch gears, dam, barrage, tunnels, channel, transformer, electrical, erection and commissioning cost. All these costs are based on CEA approval of 26/02/99 copies of which have been submitted to DOE for verification. . Validation Team had, therefore, accepted the cost. The financing pattern yields a gearing of 50:50, which is based on CEA approval. The profitability estimates of the project, which forms the basis for IRR calculation is based on installed capacity, PLF, power tariff, O&M cost, depreciation, taxation. The installed capacity is a computed	☒ Argument justified / significant barrier

Step # / Barrier	Demonstration	Assessment
	figures based on the capacity of hydro units, which is evidenced by the purchase orders. PLF is based on the Design Energy - Min of Power Approval No. 8/1/99.So this is meeting the requirements of EB 48 Annex 11. Power tariff is based on PPA signed by the project proponent with Power department, Government of Sikkim a state utility, to whom the entire power would be exported. O&M cost is based on CERC tariff order / Min of Power Approval No. 8/1/99. The project developer has adopted CERC recommended straight line depreciation for computing book profit and Income Tax Act stipulated WDV depreciation for plant and machinery and civil works for income tax calculation, which are accepted accounting methods. The block of assets has been computed for depreciation purpose as per the accepted accounting principles. Tax liability has been calculated as per the income tax rules and the rulings given. The project IRR has been computed for a period of 35 years, which is the life time of the project and is in conformity with the Annex 58 of EB 51 and Annex 15 of EB 50. As required by Annex 58 of EB 51 the expected profit on the sale of assets at the end of the operating life has been taken as salvage value in the terminal year. In computing the IRR, the project developer has taken into account profit after tax, depreciation and interest on term loan, and salvage value (in the terminal year). The principle adopted	

Step # / Barrier	Demonstration	Assessment
	conforms to the accepted accounting and taxation principles. Based on the above, the project IRR works out to 7.82% in contrast to the benchmark of 12.75%. In the above background, the Validation Team is convinced that the project is additional and not a business-as-usual scenario. The robustness of this conclusion was checked by subjecting critical factors to reasonable variations. Four factors have been identified as critical, viz., Power generation, O&M cost, tariff rate and project cost. These factors have been subjected to 10% variation on either side and revealed that project IRR is not crossing the benchmark of 12.75 %.	
Step 3: Common Practice Analysis	As regards common practice barrier, the statistics furnished by the PP as well as independently collected by DOE; reveal that at the time of installation of the project activity, only 2.35 % of hydro power potential is harnessed in the state of Sikkim. As verified from the public domain, potential for hydro project is 4286 MW and only 100 MW is installed in 1999 and are mainly consists of small hydro power projects. Further, Sub steps 3(a) and 3 (b) are applied by the PP as per the "Tool for the demonstration and assessment of Additionality" to analyze the common practice. Substep 3(a) requires the analysis of any other activities that are operational and that are of similar capacity to the proposed project activity in the same region.	☐ Argument not justified ☐ Argument not convincing ☐ Argument justified but not a decisive barrier ☒ Argument justified / significant barrier DOE is convinced that the implementation of large hydro power projects is not a common practise in the region

Step # / Barrier	Demonstration	Assessment
	As verified by the validation team from *Energy and Power Department, Government of Sikkim, India*, there was only one large hydro power project operating in Sikkim state with the installed capacity of 60 MW at Rangit River prior to Teesta – V project. Same is also not falling under similar capacity as the total installed capacity of the project activity is 510 MW. Sub step3(b) requires to assess similar options that are occurring. For the project activity, at the time of the implementation no other project of similar capacity is underway. Same is confirmed from the information available from Central electricity Authority, Ministry of power and Sikkim power department.	
Assessment of the validation team		☒ Project is additional ☐ Project is not additional

Sensitivity analysis:

The Guidance on Assessment of Investment Analysis requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation (± 10%). The project developer has identified Power generation, project cost, tariff, O&M cost as the most critical assumptions. Accordingly, sensitivity analysis was done by the project developer to analyze the impact of a reasonable change (± 10%) in the chosen parameters on the additionality of the project activity. The sensitivity analysis reveals that even under more favorable conditions, the IRR would not cross the benchmark return as given in the following table:

Sensitive factors	-10%	Baseline	+10%
Power generation	6.85%	7.82%	8.67%
Project cost	8.78%	7.82%	6.93%
Tariff	6.84%	7.82%	8.67%
O&M cost	7.91%	7.82%	7.67%

Nevertheless, CARs (2.3-2.11) and CR (2.1 to 2.5) were and successfully closed. The list of the CARs and the CRs is as follows.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 2.3 Considering the fact that it is a large scale project and CDM methodology is being used to demonstrate additionality, the write up should conform to the guidance given in the Additionality Tool	/XLS1/ /PD01/	The project test of the VCS standard is used to demonstrate the Additionality of the project. It has been made in line with the Additionality tool requirements.	/PD02/ /Section 2.5/	PD/PD02/ has been modified and is in line with Additionality Tool. CAR is closed (02/01)
CAR 2.4 Common practice analysis does not conform to the guidance given in the Additionality Tool.	/XLS1/ /PD01/	The common practice is revised to conform to the guidance in the Additionality Tool.	/PD02/ /Section2.5/	Common practice analysis has been revised and now is in conformity with guidance given under additionality tool. CAR is closed (02/01)
CAR 2.5 While the O&M cost at 1.5% of the capital cost appears to be in conformity with CERC Order, escalation at 6% does not. CERC has recommended only 4% escalation.	/XLS1/ /PD01/	The O&M cost escalation is 6% at the time of conceptualization of project as per CERC norms. 05/01/2009 The reference to 6% O&M is referred based on Ministry of Power approval of the project. Copy of the same is provided.	/XLS2/ /PD02/	Evidence/exact website address may be furnished. CAR is open (02/01) The evidence to consider 6% increase in O&M cost has been submitted to the DOE.CAR is closed. (13/1)
CAR 2.6 Tax rate has been taken at 11.22% and 33.66%, which does not seem to correspond to the rates prevailing either at the time of decision making or at the time of commencement of generation (though this is not correct)	/XLS1/ /PD01/ Section 2.5	Tax rates at the time of CEA approval for the project in 1999-00 are considered for the project.	/XLS2/ /PD02/	Tax rate has been modified and represents the rate prevailing at the time of decision making. CAR is closed (02/01)
CAR 2.7	/XLS1/	The project com-	/XLS2/	Financial projec-

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
First year should be 2007-08 as the project is reported to have commenced generation on February 25, 2008. Accordingly, the first year generation, revenue and cost should be for 37 days.		menced commercial generation from 1st March 2008 (25th February is the date of testing of the turbine unit), thus the revenue generation for 31 days of the first year is considered. 05/01/2010 Appropriate corrections are made in the financials.		tions have been modified. However, the projections have not been accounted for in the IRR worksheet. CAR is open (02/01) Projections account for the generation. CAR is closed (13/1)
CAR 2.8 Interest computation does not appear to be correct. It should commence from Feb 25, 2008 – the date on which the project is reported to have commenced generation. Computing average balance can start from October 2008 onwards, as the repayment falls due only from October 15. This comment holds good for all loans.	/XLS1/	Interest computation is revised as the CEA approval. Interest for the month of March has been taken in the year 2007-08.	/XLS2/ /PD02/	Interest computation has been corrected. CAR is closed (02/01)
CAR 2.9 IT depreciation rate considered does not appear to be in conformity with Section 32 of IT Act read with Appendix I of Income Tax Rules.	/XLS1/	The IT depreciation rate is considered separately for civil works and plant and machinery in the revised sheet as per Section 32 of IT Act. 05/01/2010 IT Depreciation rates have been corrected in conformance with IT Rules in operation at the time of decision making.	/XLS2/	Even the revised depreciation rates and computation do not appear to be in conformity with IT Rules in operation at the time of decision making. CAR is open (02/01) IT depreciation rates have been changed and is in conformity with the IT Rules in operation at the time of decision

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				making. CAR is closed (13/1)
CAR 2.10 Tax computation does not appear to be correct. This may be checked	/XLS1/	Tax computation is revised in the worksheet.	/XLS2/	Tax computation has been corrected and now is in conformity with the income tax rules. CAR is closed (02/01)
CAR 2.11 Entire investment has been accounted for in one year. This does not seem to be in conformity with published information.	/XLS1/	The investment approved by CEA for the project is considered in the financial analysis. 05/01/2010 The investment in the project activity has been spread over the implementation period.	/XLS2/	Response does not seem to have any relevance to CAR. CAR is open (02/01) Investment is spread over the implementation period as per CEA approval. CAR is closed (13/1)
CR 2.1 The project life time is taken as 35 years. Clarify how this conforms to Annex 15 of EB 50. Likewise, clarify how the PLF conforms to Annex 11 of EB 48	/PD01/	The EB 50 Annex 15 guidelines are for evaluating the "remaining lifetime of the project". Hence they are not applicable to the project which is a green field project. The PLF for the project is calculated as per the design energy of the project which is referred in the CEA - TEC approval granted for the project. 05/01/2010 The project lifetime is 35 years. The following web link from Ministry of Power is the reference for the same. http://www.power	/PD02/	Then the basis for determining the life time of the project as 35 years in the VCS PD/PD02/ (p.28) which seems to form the basis for projections may be stated. CAR is open (02/01) CEA documentation for PLF is accepted as it conforms to Annex 11 of EB 48. CAR is closed (02/01) Project lifetime of 35 years is verified from web link. CAR is closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		min.nic.in/acts_notification/generating_companies.htm It has been included on page 33 of VCS PD also.		
CR 2.2 The project commenced generation on February 25, 2008. Clarify the rationale for selecting the PLR of February 2008 as benchmark.	/PD01/	The benchmark for the project has been corrected. Since the approval for the project was granted in February 1999 by CEA, the corresponding lending rate for the month is considered as the benchmark for the project.	/PD02/	Benchmark has been corrected. CAR is closed (02/01)
CR 2.3 Power tariff has been taken as constant throughout the life of the project. Please clarify whether this is in conformity with PPA and the evidence there for may be submitted.	/PD01/	The CERC decides the tariff for the project annually as per the PPA on a cost-plus basis. The tariff accorded by CERC for the first year of generation for Teesta is Rs. 1.62/ unit. This tariff rate will reduce through the life of the project. This is because tariff determination as per CERC is a function of the following five factors – interest on loan, O&M cost, interest on working capital, Return on equity (RoE) and depreciation. Amongst these, RoE and the interest on working capital are fixed, while the interest on loan and depre-	/PD02/	Clarify whether it has decreased or remained constant or increased since the commencement of generation. CAR is open (02/01) The copies of the invoice submitted have been verified by the validation team. The tariff considered in the invoice has been verified to be Rs. 1.62/kWh even after the first year of operation of the plant. CAR is closed.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
		ciation will decrease every year through the life of the project. The O&M cost is the only component which will increase during the operational life as the machinery is exposed to more wear and tear. Thus, analysis of all the factors shows that over the operational life of the project, the tariff will decrease as the interest on loan reduces and the asset life is also depreciated every year, and the implication of these factors is significant in comparison to the other factors. Hence for Teesta power project also the tariff will decrease over its operational life. 05/01/2010 It has not changed since the start. The tariff is still Rs. 1.62/kWh. Copy of recent invoice is provided.		
CR 2.4 The hydropower potential harnessed so far in Sikkim has been stated to be 1.96% vide p.16. This claim is not borne by the website referred to in the PD. Furnish the source for this statistics. Also clarify the reasons for	/PD01/	The % figure is corrected in the revised PD. The website refers to the same in terms of MW and % is a calculated figure. As per the "*Tool for the demonstra-*	/PD02/	The figure has been corrected and the explanation on geographical region definition is accepted. CAR is closed (02/01)

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
defining the geographical region to Sikkim only, considering the fact that the project is very large and that the promoter is NHPC.		*tion and assessment of Additionality"* Sub step 4a requires that the analysis must be of projects belonging to the same country or region. Since the project is located in Sikkim, it is prudent to compare hydro projects in the same region as they belong to similar climatic conditions, are majorly located on the Teesta River basin and face similar kind of barriers.		
CR 2.5 Following documents/documentary evidence should be submitted: a) Project cost b) PPA c) Loan sanction letter d) Conformity to Annex 11 of EB 48 e) Conformity to Annex 15 of EB 50	/PD01/	All evidences are submitted to DOE only point (f) is not applicable to the project activity.		Documents submitted have been verified by the validation team and it is concluded that the information provided in these document is in line with the facts and figures presented in VCS PD/PD02/ and calculation sheet/XLS02/. CR is closed (02/01)

3.3 Monitoring Plan

The project applies approved monitoring methodology

ACM0002/Version 10, Sectoral Scope: 1, EB 47

Title: "Consolidated monitoring methodology for grid-connected electricity generation from renewable sources"

The methodology requires monitoring of net electricity generation supplied by renewable technology installed by the project proponent to the grid.

The monitoring plan/PD01/PD02/ provides detailed information related to the collection and archiving of all relevant data needed to:

- Determine the baseline emissions (i.e. Net Electricity supplied to the grid by the project activity during the year y –EG_Y)

As per the monitoring plan, individual special energy meters are installed at three generating units of 400 kV Generator transformer. Energy generated by the project activity is delivered to the grid by two transmission lines and each line is having special energy meters (Main meter and Check meter) to measure the export and import of electricity to the grid. Net electricity exported to the grid is calculated based on the same (Export – Import). Project proponent and Power grid Corporation Limited take joint meter reading every month and will be used for the Emission reduction calculations.

During the site visit, it is verified that all the energy meters are installed properly and are of 0.2S class accuracy, which ensures the continuous measurement of net electricity exported to the grid by the project activity. Also Joint monthly metering details/JMR/ issued by Power Grid Corporation Limited were verified.

The monitoring plan/PD02/ provides detailed information related to the collection and archiving of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions
- Estimate changes in emissions from the site

During the site visit , validation team is convinced that the parameter Net Electricity supplied to the grid by the project activity during the year is monitored through 0.2 class accuracy special energy meters.(Main meters and Check meters) Export and import of electricity are separately monitored. These meters are installed at substation from where electricity is evacuated to the grid. Joint Meter Readings/ monthly statements are taken by state electricity Board personnel and represntative of project proponent every month, This will serve as a basis of emission reduction Joint meter readings / Monthly statement are cross checked by validation team during site visit.

Calibration, periodical testing and maintenance procedures of monitoring equipment are clearly mentioned in the section 3.3 and 3.4 of the VCS PD/PD01/PD02/. The same is found to be adequate. Calibration of the energy meters will be carried out once in three year. This meets the guidelines issued by UNFCCC in EB 35. Validation team has reviewed sample calibration certificate/CAL/ for energy meters during the site visit.

During the onsite visit, the data monitoring was found to be inline with the monitoring plan and deemed to be OK. The measurements are recorded every month. Electricity sale invoices will be kept for cross-check. Responsibilities related to monitoring were assessed and found OK.

Nevertheless, CARs (3.1) had been raised and successfully closed. The list of the CAR is as follows.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 3.1 The net electricity is the only parameter based on which the ex-post emission reduction will be calculated. Thus the other two parameters included in section 3.3 of the VCS PD may be removed.	/PD 01/ /Section-3.3/	The two parameters are removed from the monitoring section of the PD.	/PD 02/ /Section-3.3/	The power density of the project is 752.7 W/m^2 which is more than 10 W/m^2 Hence as per approved monitoring methodology ACM 002 V 10, parameter TEG_y and Aux is not required to be monitored. Necessary corrections made in the VCS PD/PD02/. CAR is closed.

3.4 Calculation of GHG Emissions

As per the approved methodology ACM 0002, baseline emission are calculated by multiplying net electricity exported by the project activity in kWh with combined margin grid emission factor.

The combined margin grid emission factor determined ex-ante and fixed for entire crediting period of ten years is found to be correct and conservative as explainted in section 2.4 of VCS PD/PD02/.

The calcultion of the project emission, baseline emission and leakage used for calculating the emissions reduction presented in the VCS PD/PD01/D02/ section 4 and emission reduciton calculation sheet/XLS1/XLS2/ is in line with the approved methodology.

The calculation method of the OM and BM is derived from the guide of OM and BM calculation issued by CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 4,)issued by CEA.

The baseline emission factor is equal to the CM, which is applying the default weights are as follows: w_{OM} = 0.5 and w_{BM} = 0.5 for operating margin emission factor and the build margin emission factor.

The calculations were checked by the validation team and found to be correct and presented in transperent manner.

As per the approved methodology ACM 002 Version 10, as the project activity is based on the renewable source of enrgy,there is no project emission from the project activity. Same is verified by validation team by conducting document review.

The leakages are not considered as per the approved methodology.

Nevertheless the following CAR was raised and closed successfully.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 4.1 The equation used for the emission reduction calculation in page 17 of the VCS PD should be as per the methodology ACM 0002.	/PD 01/ /Section-3.2/	The equation is corrected as per the methodology.	/PD 02/ /Section-3.2/	Same is corrected and now it is in line with the approved methodology ACM 002. CAR is closed.

3.5 Environmental Impact

Environmental Impact Assessment is carried by the project proponent for the project activity through Environment and Pollution Control Division of Forest Department and the State Land Use and Environment Board.

Validation team has reviewed the Environmental Impact assessment/EIA/ for various impacts on surrounding ecology due to implementation of the project during construction and operational phase. As this project is run-of river project and using renewable sources of energy for the generation of power, it does not have significant impact on the environment. Also Validation team has reviewed the environmental clearance issued by the Ministry of Environment and forest (MoEF), India and confirmed that project is fulfilling the regulatory requirements.

Discussion on possible impacts on water environment, land environment, air and noise environment, biological environment and socio –economic environment is discussed in section 5 of VCS PD. Validation team has reviewed the same by conducting document review and site visit.

3.6 Comments by stakeholders

project proponents has organized a local stakeholder consultation meeting on 02/12/1997 to discuss the issues related to environmental and social impacts of the project activity and to discuss their concerns related to development and operation of the project. Land

Use and Environmental Board, Forest Department had conducted the public hearing as a part of the EIA requirement. Proof for local stakeholder consultation process/PHR/ submitted by project proponent was reviewed by validation team.

Comments, suggestions were invited from one and all on the project activity.A summary of the comments received and a note (through meeting and feed back questionnaire) on how due account was taken of the concerns raised in the above public consultation is included under section 6 of the VCS PD/PD01/PD02/.The stake holders were invited during the site visit conducted by the validation team. No negative comments were received from any of the stake holders.

Nevertheless the following CAR was raised and closed successfully.

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 6.1 The proof of stake holder consultation process conducted by the PP may be submitted to the DOE.	/PD 01/ /Section-6/	The proof of stakeholder consultation is provided to DOE.	/PD 02/ /Section-6/	Proof of stakeholder consultation is received. CAR is closed

4 Validation conclusion

National Hydroelectric Power Corporation Limited has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: “Teesta-V Hydro Power project in Sikkim by NHPC Limited, India” with regard to the relevant requirements of the VCS, as well as criteria for consistent project operations, monitoring and reporting.

The project intends to generate electricity by exploiting the hydro energy potential of the river Teesta in the state Sikkim of India. The project comprises installation of three power generation units of capacity 170 MW each aggregating a total installed capacity of 510 MW.This renewable energy project is based on the run-of-river scheem and consists of a concrete gravity dam across the river Teesta. Annual enrergy to be produced from the project activity has been estimated to be approx. 2572.67 million units of electricity considering a PLF of 56.7 %. The generated electricity will be exported to the NEWNE grid of India out of which 12% will be credited to Sikkim state government as free power. The project started generating commercial power since 1st March 2008.

The review of the VCS PD/PD01/ and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 16 Corrective Action Requests (CAR) and 05 Clarification Requests (CR) were raised and successfully closed out.

The validation is based on the VCS PD/PD01/PD02/, proof of title/MoPA/TEC/, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validates by project proponent.

As a result of the validation, the validates confirm that:

- The project fulfils criteria of VCS 2007.1 provided.
- The project additionality is sufficiently justified in the PD/PD01/PD02/.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM 0002, version-10.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 20444420 t CO_2e (total) is most likely to be achieved within the 10 years renewable crediting period which will be renewed twice.
- No restrictions or uncertainties were identified related to the validation.

Vadodara, 2010-01-21

Pankaj Patel
TÜV NORD JI/CDM Certification Program

Essen, 2010-02-23

Rainer Winter
TÜV NORD JI/CDM Certification Program

Table 5.1:Documents provided by the project proponent

Reference	Documents
/CC/	Commissioning Certificates: Dated 24/02/2008 (#2), 02/04/2008 (#3) and 09/04/2008 (#1)
/DEC/	Declaration letter from PP regarding confirmation of not creating any other form of environmental credit. dated 20/01/2010
/EIA/	Environment Impact Assessment Clearance dated 19/05/1999
/FC/	Forest Clearance dated 14/05/1999
/JMR/	Joint Monthly Metering details.
/LA/	Loan Agreement / document between bank and PP (Loan sanction letter)dated 27/09/2002
/LSC/	Proof of local stakeholder consultation process:
/MoPA/	Ministry of power approval dated 11/02/2000
/PCB/	Pollution control board clearance dated 07/01/2009
/PHR/	Public hearing report dated 02/12/1997
/PPA/	Power purchase agreement dated 09/05/2002
/PD01/	Initial VCS PD dated 30/09/2009
/PD 02/	Final VCS PD dated 24/12/2009
/PPA/	Power Purchase Agreements dated 09/09/2009
/SC/	Statutory Clearances Forst clearance dated 14/05/1999 Ministry of power clearance dated 11/02/2000 State pollution control board consent dated 07/01/2009
/TS/	Technical specifications
/TEC/	Techno Economic clearance dated 26/02/09
/XLS1/	Initial Excel calculation sheets provided by the project participant.
/XLS2/	Final Excel calculation sheets provided by the project participant.

Table 5.2: Background investigation and assessment documents

Reference	Document
/ACM 0002/	Consolidated methodology for grid-connected electricity generation from renewable sources (Version 06: 19 May 2006)
/TE/	Tool to calculate emission factor for an electricity system.
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/CEA/	CO_2 Baseline Database for Indian Power Sector –User Guide, Ver 04 published by CEA.
/TA/	Tool for the demonstration and assessment of additionality
/VVM/	CDM Validation and verification Manual (V. 01.1,EB 51,Annex-03)

Table 5.3: Websites used

Reference	Link	Organisation
/cea/	www.cea.nic.in	Central Electricity Authority, Ministry of Power, Government of India
/imef/	www.envfor.nic.in	Indian Ministry of Environment and Forest
/imp/	www.powermin.nic.in	Indian Ministry of Power
/NHPC/	http://www.nhpc.nic.in/	National Hydro Electric Corporation Limited.
/unfccc/	http://cdm.unfccc.int	UNFCCC
/VCS/	www.v-c-s.org	VCS website

Table 5.4: List of interviewed persons

Reference	MoI[1]		Name	Organisation / Function
/IM01/	V	☒ Mr.	S.N Verma	NHPC Limited

Reference	MoI[1]		Name	Organisation / Function
		☐ Ms		
/IM01/	V	☒ Mr. ☐ Ms	D chatopadhyay	NHPC Limited
/IM01/	V	☒ Mr. ☐ Ms	S.S Bharati	NHPC Limited
/IM01/	V	☒ Mr. ☐ Ms	Pradeep Kumar Das	NHPC Limited
/IM01/	V	☒ Mr. ☐ Ms	Pradipta Kumat Das	NHPC Limited
/IM01/	V	☒ Mr. ☐ Ms	Himangshu Saha	NHPC Limited
/IM02/	V	☐ Mr. ☒ Ms.	Subuddhi Banthia	Consultants EVI
/IM03/	V	☒ Mr. ☐ Ms.	Shyamlal Sharma	Stake Holder
/IM03/	V	☒ Mr. ☐ Ms.	Gauri Shankar Sharma	Stake Holder
/IM03/	V	☒ Mr. ☐ Ms.	Yadu Gautam	Stake Holder
/IM03/	V	☒ Mr. ☐ Ms.	Gupta Subba.	Stake Holder
/IM03/	V	☒ Mr. ☐ Ms.	Gopal Chetri	Stake Holder

[1)] Means of Interview: (**T**elephone, **E**-Mail, **V**isit)