VOLUNTARY CARBON STANDARD 2007.1

VERIFICATION REPORT

TEESTA-V HYDRO POWER PROJECT IN SIKKIM BY NHPC LIMITED, INDIA

Monitoring Period: 2008-04-01 to 2009-09-30

(incl. both days)

Report No: 8106164066 - 10/34

Date: 2010-12-21

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Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2010-12-21
Report Title:	**Approved by:**
Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India	Mr. Rainer Winter
Client:	**Project Title:**
National Hydroelectric Power Corporation Limited (NHPC)	Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India

Summary:

National Hydroelectric Power Corporation Limited (NHPC) has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India" in East district of Sikkim, India with regard to the requirements of VCS 2007.1 Standard.

The project activity involves the 96.45 m high concrete gravity dam across river Teesta with a 17.2 km long head race tunnel and an underground power housing three generating units of 170 MW capacity each. The tail race tunnel is D-shaped and 125m long. The penstock is of vertical pressure shaft type.

The project will provide the state with a clean source of energy which can be utilized not only for meeting the energy demand, but also reducing dependency on fossil fuel or wood but also provide a source of revenue and development opportunities in the state. The catchment area of the project is 4307 sq. km.

Reporting period:From 01-04-2008 to 30-09-2009(Including both days)

In the course of the verification 12 Corrective Action Requests (CARs), were raised and yet to be successfully closed.
The verification is based on the draft monitoring report, the monitoring plan as set out in the validated PD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.
As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated

without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows: **Emission reductions 2970612 t CO2 equivalents**

Work carried out by:	Number of pages:
Mr. Pankaj Patel Mr. Hemang Shah Mr. Saroj Sahoo Mr Indrapal Parmar Mr Sanjay Kandari	33

Abbreviations

BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
CL	Clarification Request
DNA	Designated National Authority
EB	CDM Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCS - PD	VCS - Project Description
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual

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1 INTRODUCTION

National Hydroelectric Power Corporation Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project: "Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India" with regard to the relevant requirements of the Voluntary Carbon Standard 2007.1[/VCS/]. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2008-04-01 to 2009-09-30; the applied monitoring methodology is ACM0002, Version 10 "Consolidated monitoring methodology for grid-connected electricity generation from renewable sources".

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the VCS-PD;
- to assess the project's compliance with other relevant rules, including the host country (India) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification of this project is based on the validated project design document [/VCS-PD/], the monitoring report[/MR1/], emission reduction calculation spread sheet[/XLS1/], supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 VCS Project Description

1.3.1 Project Characteristics

Essential data of the project is presented in the following Table 1-1.

Table 1-1: Project Characteristics

Item	Data			
Project title	Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India			
Project owner	NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED (NHPC)			
Any specific project categories	☒ Mega project (> 10^6 t CO_{2eq} / a) ☐ Micro project (< 5000 t CO_{2eq} / a) ☐ AFOLU project ☐ Grouped project ☐ No specific project category			
VCS PD dated	Draft:	30/09/2009	Final:	24/12/2009
Applied Methodology	ACM0002, Version 10			
Project starting date	01/03/2008 As per validated VCS PD			
Crediting period	☒ Renewable Crediting Period (10 y) ☐ Fixed Crediting Period (10 y)			
Start of crediting period	01/04/2008 As per validated VCS PD			

1.3.2 Project Location

The details of the project location are given in table 1-2:

Table 1-2: Project Location

No.	Project Location
Host Country	India
Region:	Sikkim
Project location address:	East district of Sikkim state
Latitude:	27º15´00” N
Longitude:	88º27´30” E

1.3.3 Technical Project Description

Teesta V hydro project is a run of river project having a total capacity of 510 MW (3 x 170 MW), located in the Sikkim state of India. This project activity consists of 96.45 metre high and 182.50 metre long Concrete Gravity Dam, a 9.5 metre diameter and 17.2 km long Head Race Tunnel, a 30 metre diameter and 92 metre high semi underground Surge Shaft.

The key parameters of the project are given in table 1-3:

Table 1-3a: Technical data in the project

Parameter	Unit	Value
Hydrology		
Catchment Area	sq. km	4307
Design Discharge	cumecs	9500
Diversion Tunnels		
No.		2
Lengths	metres	410 m and 550 m
Head Race Tunnel (HRT)		
No.		1
Diameter and Height	metres	25 m and 92 m
Design Discharge	cumecs	292.37
Tail Race Tunnel (HRT)		
Type		D – Shaped
No.		3
Design Discharge	cumecs (each)	97.45
Power House (Francis)		
Type		Underground
Design Discharge – 3 units	cumces	292.37 cumces
Installed Capacity	MW	510 MW
Gross Head	Metres	216.73 m
Net Head	Metres	197.57 m

Table 1-3b: Parameters confirmed during verification

Parameter	Unit	Value
Design Discharge	Cumecs	9500
Diversion Tunnels		
No.		2
Lengths	Metres	410 m and 550 m
Design Discharge	Cumecs	9500
Power House (Francis)		
Type		Underground
Design Discharge – 3 units	Cumces	292.37 cumces
Installed Capacity	MW	510 MW
Gross Head	Metres	216.73 m
Net Head	Metres	197.57 m

1.3.4 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities a verification team was appointed. Furthermore also the personnel for the technical review and the final approval were determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-4 below.

Table 1-4: Involved Personnel

	Name	Company	Function [1)]	Qualification Status [2)]	scheme competence	Technical competence	Host country Competence	Controlling competence
☒ Mr. ☐ Ms.	Pankaj Patel	TUV India Pvt. Ltd.	TL	A	☒	-	☒	☒
☒ Mr. ☐ Ms.	Hemang shah	TUV India Pvt. Ltd.	TM	E	☒	S	☒	☐
☒ Mr. ☐ Ms.	Saroj Sahoo	TUV India Pvt. Ltd.	TM	E	☒	-	☒	☐
☒ Mr. ☐ Ms.	Indrapal Parmar	TUV India Pvt. Ltd.	-	T	☐	S	☒	☐
☒ Mr. ☐ Ms.	Samir Beqqal	TUV NORD Cert Gmbh	TR	E	☒	-	☐	☐
☒ Mr. ☐ Ms.	Rainer Winter	TUV NORD Cert Gmbh	FA	TR/SA	☒	S	☐	☒

[1)] TL : Team Leader; TM : Team Member, TR: Technical review; FA: Final approval;

[2)] GHG Auditor Status: A : Assessor; E : Expert; SA: Senior Assessor; T : Trainee; TE Technical Expert

1.4 Level of Assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

2 METHODOLOGY

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report/MR/ submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 2.1 below:

Table 2.1: Verification sequence

Topic	Time
Assignment of verification	2009-10-12
On-site visit	2010-05-26
Draft reporting finalised	2010-06-07
Technical review on draft reporting finalised	-
Final reporting finalised	2010-12-21
Technical review on final reporting finalised	2011-01-21
Final corrections	-

The main verification steps are described below.

2.1 Review of Project Documentation

The VCS PD /VCS-PD/, Monitoring report/MR1/MR2/, Emission reduction calculation sheet/XLS1/XLS2/ and supporting background documents related to the project design and baseline were reviewed.

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

The references used in the course of this verification are summarized in section 5.

2.2 On-Site Assessment

2.2.1 Review of Performance Records

National Hydroelectric Power Corporation Limited (NHPC) has systamatic collection and maintenance procedures for the records of energy exported to the grid. NHPC has implemented SCADA system to capture the contineous data of all the parameters involved for power generation. All the data related to VCS verification are kept in hard copy as well as soft copy. Verification team has cross checked the net energy exported to the grid readings in soft copy. Monthly Special Energy Meter Readings/SEM/ are taken every month from the energy meters installed on both 400 KV outgoing transmission lines. This measures net electricity supplied to the grid by the project activity. Also calibration certificate/CAL/ for energy meters were checked for accuracy of the measurement.

2.2.2 Follow-up Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

During verification the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 2-2.

Table 2-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives/IM01/ (National Hydroelectric Power Corporation Limited) a) Mr. J.D. Jha	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation / previous

Interviewed Persons / Entities	Interview topics
b) Mr. S. Paswan c) Mr. Diliram Sharma d) Mr. G.H. Saha e) Mr. Umesh Singh f) Mr. B.K. Singh g) Mr. K.K. Maheshwari h) Mr. Deepak Kumar i) Mr. A. Tiwary j) Mr. R. Gangopadhyay k) Mr. P.K Das l) Mr. H Saha	verifications - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Editorial issues of the Monitoring Report

A comprehensive list of all interviewed persons is part of section 5 'References'.#

2.2.3 Collection of Measurements

PP has submitted monitoring report/MR01/MR02/ describing various details of the project activity, monitored parameters and ER calculations. The reporting /MR01/MR02/ XLS1/XLS2/ is in line with the requirements of the validated monitoring plan/VCS PD/ as well as with the applied methodology.

The reporting procedures reflect the requirements of the monitoring plan / VCS PD/. As verified by the verification team during the site visit, the net electricity supplied by the project activity to the grid is monitored continuously and recorded once every month and stored appropriately in the log books during the whole monitoring period. Special Energy Meter statements/SEM/ are prepared by the representatives of NHPC. These data form the basis of emission reduction calculation. Verification team has cross checked the monthly Special Energy Meter Statements/SEM/, log books/LOG/, VCS PD/VCS-PD/ and confirmed that the net electricity supplied to the grid by the project activity is appropriately measured and recorded by the PP as per the validated monitoring plan and approved methodology.

As per the Validated VCS PD/VCS-PD/, Net electricity supplied to the grid by the project activity (EG_{PJ},y) is the only parameter which is to be monitored during the whole crediting period.

2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment

National Hydroelectric Power Corporation Limited (NHPC) is involved in the power genration business since long and having established good practices for operation and maintenance of the hydro power. Verification team has also witnessed the same during the site visit. NHPC has installed SCADA system for operation of the hydro machins installed by M/s TOSHIBA.

As verified during site visit, PP has installed total four nos of energy meters having accuracy class 0.2 S to ensure the consistent contineous measurement of the electricity exported to the grid. One main meter and one check meter are installed at 400 KV Teesta-Binaguri Line 1 and 400 KV Teesta-Binaguri Line 2 (Out going lines) and same are used to measure the net electricity supplied to the grid by the project activity ($EG_{PJ,Y}$). This forms the basis of emisison reduction.

The calibration certificates/CAL/ of the main meters and check meters were verified. Calibration certificate for each meters are available dated 12/10/2006. As per validated VCS PD calibration is required to be carried out every three years. Hence next calibration is due on 12/10/2009. Hence during monitoring period calibration certificate is valid. Also the accuracy of the meters was found to be in the range of specified limit in the monitoring plan.

2.3 Determination of the reductions in GHG emissions

Emission reduction is calculated based on the actual monitored parameter $EG_{PJ,Y}$ i.e. Net electricity supplied to the grid by the project activity multiplied by grid emission factor. Net electricity supplied to the grid is calculated by export minus import reading taken from the energy meters. Grid emission factor was fixed ex-ante and is taken as 0.803 tCO2/MWh from validated VCS-PD/VCS-PD/. This Grid emission factor has been derived from the “CO2 Baseline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 4.0.As per the approved methodology ACM 0002, project emission and leakage emission are correctly taken as zero.

2.4 Review of additional data from other sources if appropriate

Electricity generation data measured by the PP is cross checked with the Monthly Special Energy meter statements/SEM/ which form the basis of emission reduction.

2.5 Review of monitoring results and verification of the correct application of monitoring methodologies

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS. Project activity being grid connected hydro electric project using renewable source of energy, parameters as required by approved baseline and monitoring methodology ACM 0002 is correctly monitored.

2.6 Resolution of any material discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 3 of this report.

3 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS PD, site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
3.1	Remaining issues, including any material discrepancy	-	-	-
3.2	Project implementation	02	-	-
3.3	Completeness of monitoring	07	-	-
3.4	Accuracy of emission reduction calculations	01	-	-
3.5	Quality of evidence to determine emission reductions	01	-	-
3.6	Management and operational system	01	-	-
-	**SUM**	**12**	**0**	**0**

3.1 Remaining issues, including any material discrepancy, from previous validation

Description

The verification has been carried out based on the registered VCS PD/VCS-PD/ and Validation report/VAL-R/ .All raised CARs and CLs were successfully closed during the validation of the project and it was evidenced that there is no remaining issues which needs to be addressed during this verification.

Related Findings

☒ No CARs, CLs or FARs have been identified in this context

☐ The following finding(s) have been addressed:

Final Assessment

As verified from the document review it is confirmed that there is no pending issues

from previous validation.

3.2 Project implementation

Description

The project activity is to produce clean power from hydro power. Teesta V hydro project is a run of river project having a capacity of 510 MW (3 x 170 MW), located in the Sikkim state of India. This project activity consists of 96.45 metre high and 182.50 metre long Concrete Gravity Dam, a 9.5 metre diameter and 17.2 km long Head Race Tunnel, a 30 metre diameter and 92 metre high semi underground Surge Shaft. The power produced from all the units are being evacuated to the NEWNE grid of India. Same is verified during site visit. Crediting period start date is 01/04/2008 is correctly adopted as per the validated VCS PD.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**CAR 3.2-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Section 4.2 of the MR does not include technical description / specification of the hydro units, serial nos of the turbines, details of commissioning of the Hydro machines, lifetime of the machines, crediting period and status of implementation of project activity.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Details have now been included in **Table 1: Details about the units** in Section 4.2, MR version 1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Technical description of the hydro units are now included in section 4.2 of the revised monitoring report. CAR is closed.		

Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Finding:	**CAR 3.2-2**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Details of the project participant and Name of the responsible person of PP should be included in MR		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Contact details of the project participant and consultant is included in Section 8 of the MR version 1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Contact details are now included in the revised monitoring report. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Final Assessment

As verified during site visit, project is implemented as specified in the validated PD/VCS-PD/ and exporting the net electricity supplied by the project activity to the regional NEWNE grid.

3.3 Completeness of monitoring

Description

PP has submitted monitoring report/MR1/describing various details of the project activity, monitored parameters and ER calculations/XLS1/. The reporting /MR1/,/XLS/ is in line with the requirements of the validated monitoring plan as well as with the applied methodology ACM0002 , version 10/ACM0002/.

The reporting procedures reflect the requirements of the monitoring plan /VCS PD/. The net electricity exported is measured continuously and recorded once every month and stored appropriately in the spread sheets during the whole monitoring period. These data form the

basis of emission reduction calculation.

Following parameter of the project activity is required to be monitored as per the VCS PD[/VCS-PD/].

- Net electricity supplied to the grid by the project activity, $EG_{PJ, y}$

The calibration certificates[/CAL/] of the main meters and check meters were verified. Calibration certificate for each meters are available dated 12/10/2006. As per validated VCS PD calibration is required to be carried out every three years. Hence next calibration was due on 12/10/2009. As monitoring period is from 01/04/2008 to 30/09/2009, calibration certificate is valid for this monitoring period. Also the accuracy of the meters was found to be in the range of specified limit in the monitoring plan

Details of the energy meters installed are as below :

Details of the metering system:

Meter number	Model	Accuracy Class	Location	Calibration Details
NP 5896A	ER300P	0.2S	Teesta-Binaguri Line 1 main meter	Calibrated on 12/10/2006*
NP 5895A	ER300P	0.2S	Teesta-Binguri Line 1 check meter	Calibrated on 12/10/2006*
NP 5898A	ER300P	0.2S	Teesta-binaguri Line 2 main meter	Calibrated on 12/10/2006*
NP 5897A	ER300P	0.2S	Teesta-Binaguri Line 2 check meter	Calibrated on 12/10/2006*

* As per the calibration frequency once in three years, next calibration due was 12/10/2009.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**CAR 3.3-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Following documents are required to be submitted to DOE . a. Calibration certificate of energy meters b. ISO certificate c. State pollution Board Consent copy		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	a) The meters were calibrated on 12th October 2006. These certificates are made available to the DOE in Attachment 1 pgs 9-15. The PD states that these meters will be calibrated once in three years, hence the calibration is valid for the entire period considered in the monitoring report. b) & c) The PCB clearance and ISO certification are available; these have been submitted as D.5. PCB Clearance and D.2. ISO certificate.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Calibration certificate is received and verified by the DOE. Also ISO certificate and pollution control board consent copy is received by DOE and verified by the verification team and is valid CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	**CAR 3.3-2**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Description of the monitored parameter $EG_{PJ,y}$ i.e. "Net electricity supplied to the grid by the project activity" should be used consistently through out the Monitoring report. (Section 5, 6 , Table -1). Under section 5 of Monitoring report it is stated that GEF (Grid emission factor) to be monitored. However it is fixed as per VCS PD.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Suggestion has been incorporated. The term "Net Electricity supplied to the grid by the project activity during the year y" is now used consistently in MR version1.1. GEF grid emission factor is not to be monitored as per the PD, hence reference to it has been removed from Section 5: monitoring methodology and plan, MR version 1,1.		

DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Terminology used for monitoring parameter $EG_{PJ,Y}$ is now used consistently in the revised monitoring report. As grid emission factor is fixed ex-ante reference of Grid emission factor is correctly removed from section 5. CAR is closed
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Finding:	**CAR 3.3-3**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Details of total Net electricity exported to the grid by the project activity i.e. $EG_{PJ,y}$ should be summarized under section 6, Table-1 (Summation of net energy exported through line 1 and line 2). Also description of the 400 KV Line-1 (400 KV Teesta-Binaguri) and line 2 (400 KV Teesta-Binaguri) should be used consistently in MR instead of Teesta V NSLG CKT1		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	a) Table 2, Section 6.3, MR version 1.1 now includes a column: $\mathbf{EG_{PJ,y}}$:**Net Electricity supplied to the grid by the project activity during the year y,** which is the summation of the values of electricity exported through the individual lines, **Teesta V - Line 1 (400 KV Teesta – Binaguri), and Teesta V - Line 2 (400 KV Teesta – Binaguri).** b) The recommendation for consistency has been incorporated. The description of the two transmission lines is now consistently used throughout the MR version 1.1. as **Teesta V - Line 1 (400 KV Teesta – Binaguri), and Teesta V - Line 2 (400 KV Teesta – Binaguri).** Teesta V NSLG CKT1 is the description used while recording the monthly readings by the pp and grid representatives. This description will appear on the monthly meter readings taken on site that are submitted to the DOE.		

DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Details of Net electricity supplied to the grid by the project activity is now included in table-2 Section 6.3 which is the summation of the energy exported to the grid through 400 KV Teesta – Binaguri Line-1 and Line-2. Single line diagram as shown in section 7.1 of monitoring report is in line with what was verified during site visit. i.e net electricity supplied to the grid is evacuated through two 400 KV outgoing lines. Terminology used as Teesta-Binaguri line-1 and Teesta V NSLG CKT 1 are same for Line-1 and Teesta-Binaguri line-2 and Teesta V NSLG CKT 2 are same for line 2. Now same is used consistently in the MR. CAR is closed
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Finding:	**CAR 3.3-4**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Date format should be used consistently in the MR and page nos are to be included in MR. (Editorial)		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	a) Date format: xth month yyyy is the format that is consistently used in the MR version 1.1. b) As per recommendation page numbers have been included in MR version 1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Editorial corrections are made in the revised monitoring report. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	**CAR 3.3-5**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Single line diagram showing installation of energy meters and transformers should be included in the MR.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	As per recommendation single line diagram is included in section 7.1., MR version 1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Single line diagram is now included in the revised monitoring report. Net energy exported to the grid is evacuated through two 400 KV out going transmission lines. Same is in line with what is verified during site visit. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	**CAR 3.3-6**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Monitoring Report does not include Unit shut down details and training details of the operation and maintenance staff.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	These recommendations are included in MR version 1.1. under section 7.2: **Table 6**:**Shut down details**; and section 7.3: **Training of staff.** Shut down details are also available in submitted document. Outage details and training details are submitted.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Unit shut down details are now included in the monitoring report. Verification team has reviewed the monthly outage summary report to cross check the outage details. Same is found to be matching with the report. Necessary training to various employees are given by the PP. Record of training is reviewed by the verification team. Also same is confirmed during site visit by conducting interview with operational staff. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	**CAR 3.3-7**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Details of monitoring plan as per registered VCS PD and monitoring procedures adopted for the measurement of monitoring parameters need to be included in detail under section 5 of MR.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Details described in the validated PD are included in section 5, MR version 1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Monitoring plan details as per registered VCS PD is now included in the revised monitoring report. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Final Assessment

During site visit it was verified that the meters for monitoring the net electricity supplied by the project activity to the grid are installed as per the monitoring plan and the monitoring procedure followed is same as it is described both in the VCS PD/VCS-PD/ and the monitoring report/MR01/MR02/.

3.4 Accuracy of emission reduction calculations

Description

For the calculation of baseline emissions the ex-ante determined value of baseline parameters, i.e. Grid Emission Factor is taken into account which is a validated value. EF grid, $_{CM,y}$ considered is 0.803 tCO2/MWh. This Grid mission factor has been taken from the “CO2 Basline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 4.0 dated September 2008.

Verification team has cross checked all the monthly Special energy meter readings/SEM/ of energy meters installed on two nos of 400 KV outgoing transmission

lines to ascertain the net electricity supplied to the grid.

Baseline Emissions:

The formula used for the determination of baseline emissions which is consistent with the baseline methodology and VCS PD:

$BEy = EG_{PJ,y} \text{ X } EF_{grid,CM,y}$

Baseline Emissions (tCO2/yr) = Net electricity supplied to the grid by the project activity in MWh x Grid Emission Factor (tCO2/MWh)

= 2970612 tCO2 (Values are taken in round figures as per the excel sheet)

The baseline emissions (BE) during the monitoring period are 2970612 tCO2

Project Emission & Leakage:

In accordance with ACM0002 (Version 10,), the project emission and leakage were ignored.

Emission Reduction:

ERy = BEy

Emission Reduction = baseline emission = 2970612 tCO2

Emission reductions calculated for every month is rounded off to lower value by PP is acceptable as it is a conservative approach.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**CAR 3.4-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Comparison of the actual emission reduction claimed in the monitoring period with the estimate in the registered PD, and explanation on any significant increase should be included in MR.		

<table>
<tr><td>Corrective Action #1
This section shall be filled by the PP. It shall address the corrective action taken in details.</td><td>A comparison is included under section 6.4., MR version 1.1.
Table 1: Comparison between emission reductions estimated in the pd and those achieved in this verification period.
<table><tr><th>Detail</th><th>Value</th><th>Unit</th></tr><tr><td>Annual Emission reductions estimated in the PD</td><td>2044442</td><td>tCO_2/annum</td></tr><tr><td>Estimate of Emission reduction for 1.5 years (April 2008 to March 2009, April 2009 to Sep 2009)</td><td>3066663</td><td>tCO_2</td></tr><tr><td>Actual Emission reductions achieved by the Plant</td><td>2970612</td><td>tCO_2</td></tr><tr><td>Difference</td><td>-96051</td><td>tCO_2</td></tr><tr><td>Percentage difference</td><td>-3.13%</td><td>%</td></tr></table>
The achieved ER is 3.13% lower than that estimated in the PD, which is within the 10% variation considered in the PD.</td></tr>
<tr><td>DOE Assessment #1
The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</td><td>Comparison of the actual emission reduction is compared with the estimated emission reduction revels that actual emission reduction is 3.13 % lower then the estimated. Same is acceptable.
CAR is closed.</td></tr>
<tr><td>Conclusion
Tick the appropriate checkbox</td><td>☐ To be checked during the first periodic verification
☐ Appropriate action was taken
☒ Project documentation was corrected correspondingly
☐ Additional action should be taken
☐ The project complies with the requirements</td></tr>
</table>

Final Assessment

Emission reduction calculation is cross checked by the verification team with the special energy meter readings/SEM/. Grid emission factor considered for emission reduction is fixed ex-ante and is taken from the validated VCS-PD/VCS-PD/ and is based on CEA CO_2 database version 4.0. All the data captured are checked for net electricity supplied by the project activity. Emission reductions are calculated correctly by the PP for the monitoring period.

3.5 Quality of evidence to determine emission reductions

Description

The only key monitoring parameter with influence on the calculation of the emission reductions is the net power exported to the Grid. The power is measured with high accuracy 0.2 S power meters installed at 400 KV outgoing lines. Main meter and check meters are provided on both outgoing Teesta- Binaguri Line-1 and line-2.

The grid emission factor is taken from “CO2Basline Database for Indian Power Sector” published by Central Electricity Authority, Ministry of Power, Government of India, version 4.0 dated 01/09/2008 This is considered as highly reliable and authentic document. Same is fixed Ex-ante for entire crediting period and is a validated value.

Further , main meters and check meters installed on outgoing transmission lines are sealed by M/s Power grid corporation. Calibration certificate for each meters are available dated 12/10/2006. As per validated VCS PD calibration is required to be carried out every three years. Hence next calibration is due on 12/10/2009. Hence during monitoring period calibration certificates are valid.

Nevertheless the following CAR was raised and yet to be successfully closed.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**CAR 3.5-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Details of the meters used for net electricity exported to the grid along with make, accuracy class should be provided in table showing details of the metering system under section 7.1 of the MR.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Details of the meters: meter number, model, accuracy class, and location are included in Table 6, section 7.1., MR version 1.1.		

DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Details of the meters used for net electricity exported to the grid are included in the revised monitoring report. As verified during site visit and document review details provided are correct. CAR is closed.
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Final Assessment

All necessary monitoring instruments are installed. The measuring devices use a proven and state of the art technology for measurement. The details of the meters are given in the monitoring report/MR01/MR02/. Calibration has been carried out as defined in the monitoring plan and the records for the same were reviewed. Based on the same it is concluded that the recorded reading from these meters are accurate enough.

All relevant evidences i.e. Special energy meter readings/SEM/, were fully checked by the verification team during the on-site visit. All evidences are clearly identifiable and assessed to be correct.

All records needed for monitoring are archived in line with the requirements of the monitoring plan. No significant, lack of evidence and missing data were detected during on-site verification.

3.6 Management and operational system

Description

The allocation of responsibilities is documented in a written form and is followed as described in the VCS PD. Routines for the archiving of data are defined and documented. Calculations are laid down in the monitoring report is in line with PD.

Nevertheless the following CAR was raised and successfully closed.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**CAR 3.6-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Roles and responsibilities are not defined in the Monitoring report as regard to operation & maintenance and data capturing and record keeping. Organizational chart should be included in the MR.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	These are included in section 5, MR version1.1.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	As verified during site visit and conducting interview with PP, Roles and responsibilities are well defined and implemented at site for monitoring, record keeping, data capturing, operation and maintenance of the machines. Same is now included in the revised monitoring report. CAR is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Final Assessment

During the site visit verification team has reviewed the data capturing, operation and maintenance procedures followed. Also based on the interview with the operation and maintenance team it is ensured that there is a dedicated team for looking after operation and maintenance of the power house. Roles and responsibilities are well defined.

4 VERIFICATION STATEMENT

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the above mentioned project. The verification is based on the validated VCS PD/VCS-PD/, VCS validation report/VAL-R/ Policy Announcement from VCS association on 19th March, 2008 and VCS 2007.1, monitoring report/MR01/MR02 and supporting documents made available to the verifiers by the project proponent.

As a result of the verification, the verifier confirms that:

- All operations of the project are implemented and installed as planned and described in the VCS PD/VCS-PD/.
- The monitoring system is in place and functional.
- The installed equipment essential for generating emission reductions runs reliably.
- The GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

All the documents checked during on-site visit and verification process will be kept confidential and will not be disclosed at any time other than the Project Proponent consent as required by VCSA.

Monitoring period: 01/04/2008 to 30/09/2009 including both days.

Verified emission reduction generated in the above mentioned monitoring period:

Baseline emissions (t CO_2 eqv.)	Project emissions (t CO_2 eqv.)	Leakage emissions (t CO_2 eqv.)	Net Emission reductions (t CO_2 eqv.)
2970612	0	0	**2970612**

Vadodara 2010-12-21
Pankaj Patel
Verification Team Leader

Essen, 2011-01-21
Rainer Winter
Final approval

5 REFERENCES

Table 5-1: Documents provided by the project participant

Reference	Document
/CC/	Commissioning Certificates: Commercial Operation start date. NHPC, Commercial Division letter NH/Comml/F/08-09/772 dated 23/04/2008
/CAL/	Calibration Certificates for main meters and check meters dated 12/10/2006
/SEM/	Special Energy Meter readings for the period April 2008 to September 2009
/MR1/	Initial Monitoring Report submitted by the project participant Version 1.0 dated 24/05/2010
/MR2/	Final Monitoring Report submitted by the project participant.Version 1.1 dated 25/08/2010
/SC/	Statutory clearance from pollution control board dated 26/05/2010.
/XLS1/	Initial Emission reduction calculation sheets provided by the project participant along with MR1.
/XLS2/	Final Emission reduction calculation sheets provided by the project participant along with MR 2.

Table 5-2: Background investigation and assessment documents

Reference	Document
/ACM 0002/	Consolidated methodology for grid-connected electricity generation from renewable sources (Version 10)
/TE/	Tool to calculate emission factor for an electricity system.
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/CEA/	CO2 Baseline Database for Indian Power Sector –User Guide, Ver 04 published by CEA.

Reference	Document
/VVM/	CDM Validation and verification Manual
VCS	Voluntary Carbon Standard 2007.1
/VDS-PD/	Validated VCS PD dated 24/12/2009
/VAL-R/	Final Validation report dated 23/02/2010

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. ☐ Ms	Debajit Chattopadhyay	NHPC, Chief Engineer (In charge)
/IM01/	V	☒ Mr. ☐ Ms	Himangshu Saha	NHPC, Manager (Electrical)
/IM01/	V	☐ Mr. ☒ Ms.	Deepak Kumar	NHPC, Manager (Electrical)
/IM01/	V	☒ Mr. ☐ Ms	Umesh Singh	NHPC Junior Engineer, (Electrical)

Reference	MoI[1]		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms	J D Jha	NHPC Asst Manager (E) (Operation)
/IM01/	V	☒ Mr. ☐ Ms	S Paswan	NHPC Junior Engineer, (C) (Operation)
/IM01/	V	☐ Mr. ☒ Ms.	B. K. Singh	NHPC, Asst Manager, (Mechanical Maintenance)
/IM01/	V	☒ Mr. ☐ Ms	K.K. Maheshwari	NHPC, Junior Engineer (Mechanical)
/IM01/	V	☒ Mr. ☐ Ms	A. Tiwary	NHPC, Deputy Manager (Electrical)
/IM01/	V	☐ Mr. ☒ Ms.	R. Gagopadhyay	NHPC Deputy Manager (Electrical)
/IM01/	V	☒ Mr. ☐ Ms	P. K. Das	NHPC Asst Manager (Electrical)
/IM01/	V	☒ Mr. ☐ Ms	Diliram sharma	Electrician, NHPC
/IM01/	V	☐ Mr. ☒ Ms.	G. H. Saha	Wireless Operator, NHPC

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