



**Verified Carbon
Standard**

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



Document Prepared by Core CarbonX Solutions Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Teesta HE project - Stage V is a run of the river scheme connected to the NEWNE grid. Stage V of the Teesta River project has installed a capacity of 510 MW (3×170 MW turbines). The power house is located near Singtam (about 4 km upstream of the confluence of Rongnichu with Teesta). The dependable discharge available throughout the year has been assessed as 60 cumecs and gross head available is 216.73 m; for the installed capacity of 510 MW.

The project consists of 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 Teesta HE projects Stage IV is a run of the river scheme and will be producing energy to be absorbed into the Eastern region, part of the NEWNE grid at the time of commissioning of the plant, earlier there were two regional grid distribution systems in India vis-à-vis Southern regional Grid or North East West North Eastern regional grid (NEWNE). These two regional grids are integrated as single Indian Grid. The project consists of 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 capacities each. The three tail race tunnels are D-shaped and 155m, 165m, 175m long. The penstock is of vertical pressure shaft type.

The commissioning dates of the three units of the project are as given below:

S.No	Project Name	Technical Description of the Units	Date of Commissioning	Capacity
1	TEESTA- V HYDRO POWER PROJECT IN SIKKIM BY NHPC LIMITED, INDIA	Unit 1	10/04/2008	170 MW
2		Unit 2	25/02/2008	170 MW
3		Unit 3	03/04/2008	170 MW

The total emission reductions for the monitoring period (01/06/2012 to 31/03/2018) account to 11,776,268 tCO₂e.

Audit Type	Period	Program	VVB Name	Number of years
Validation	24-Dec-2009	<u>VCS</u>	<u>Tuev Nord Cert GmbH (Tuev Nord)</u>	10 Years
First Verification	01-April-2008 – 30-Sep-2009	<u>VCS</u>	<u>Tuev Nord Cert GmbH (Tuev Nord)</u>	1 Year 6 Months

Second Verification	01-Oct-2009 – 31-May-2012	<u>VCS</u>	<u>KBS Certifications Services Private Limited</u>	2 Years 8 Months
Third Verification	01-June-2012 – 31-March-2018	<u>VCS</u>	<u>LGAI Technological Center, S.A.</u>	5 Years 10 Months
Total	<u>01-April-2008 – 31-March-2018</u>	<u>VCS</u>	=	10 Years

1.2 Sectoral Scope and Project Type

- Sectoral scope: 1, Energy industries (renewable - / non-renewable sources)
- Category: ACM0002/Version 10, EB 47 “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources
- This is not a grouped project.

1.3 Project Proponent

Organization name	NHPC Limited
Contact person	Dr. Avinash Kumar
Title	General Manager (Environment)
Address	NHPC Limited, NHPC Office Complex, Sector 33, Faridabad 121003, Haryana, India
Telephone	0129-2278421
Email	cdm-env@nhpc.nic.in

1.4 Other Entities Involved in the Project

Organization name	Core CarbonX Solutions Private Limited
Role in the Project	VCS Monitoring Consultants
Contact person	Mr. Niroj Kumar Mohanty
Title	Managing Director
Address	Core CarbonX Solutions Private Limited, 5R, Block-A, #6-3-668/9, Kanthi Shikara Complex, Punjagutta, Hyderabad-500082, Telangana, India

Telephone	+91-9908387772
Email	nmohanty@corecarbonx.com

1.5 Project Start Date

The start date of the project activity is 01/03/2008 which is the start date of commercial operation of the plant.

The project start date is the earliest commissioning date amongst all the three hydro turbine units which are part of the Large-Scale Hydro Power Project.

S.No	Project Name	Technical Description of the Units	Date of Commissioning	Capacity
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3		Unit 3	03/04/2008	170 MW

1.6 Project Crediting Period

The project activity adopted renewable crediting period and an option to renew twice. The first crediting period is from 01/04/2008 – 31/03/2018.

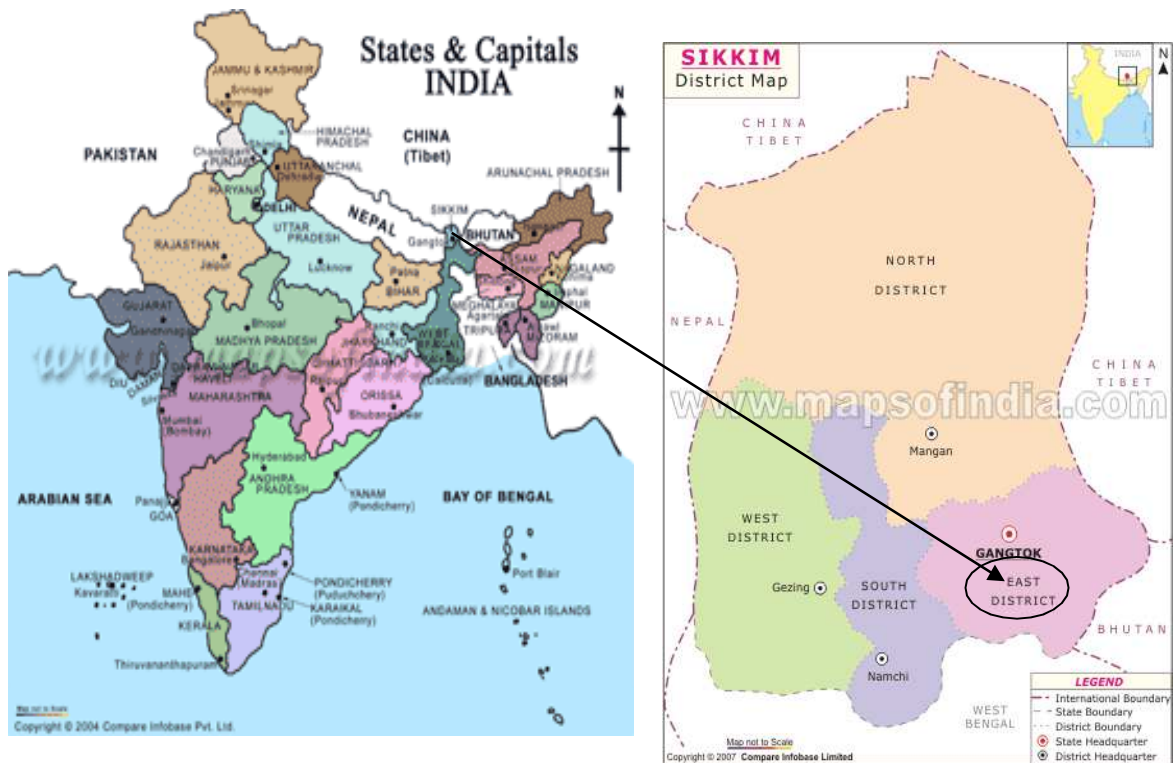
The current monitoring period is 01/06/2012- 31/03/2018 which is the third monitoring period for this project activity.

The second monitoring period was 01/10/2009 – 31/05/2012

The first monitoring period was 01/04/2008 – 30/09/2009.

1.7 Project Location

The project is located in East district of Sikkim state on the major river system in Teesta in Sikkim. The power house site is located at 88°27'30" E and 27°15'00" N. The project site is accessible from Bagdogra Airport and is situated at a distance of 140 km from the airport (power house site being 110 km away). The nearest railway points are New Jalpaiguri and Siliguri. The location of the proposed project activity is given in the following maps:



1.8 Title and Reference of Methodology

Title: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”

Reference: Approved consolidated baseline methodology ACM0002/Version 10, Sectoral Scope: 1, EB 47¹

Title: Tool to calculate the emission factor for an electricity system

Reference: Version 02, EB 50

Title: Tool for the demonstration and assessment of additionality

Reference: Version 05.2, EB 39

1.9 Participation under other GHG Programs

The project activity has not been registered with any other GHG programme.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

The project activity has not been registered with any other GHG programmes and there were no GHG emission reductions were issued in this monitoring period. The project has not been received any other forms of environmental credit, including renewable energy certificates during this monitoring period.

1.11 Sustainable Development Contributions

Teesta – V Hydro Power project in Sikkim (3*170MW) is a Greenfield Hydroelectric Project located in the East district of Sikkim state of India, situated in the east of India. The Hydroelectric plant implements the run-of-river with a pond-age scheme and consists of three turbines with 170 MW capacity and the total installed capacity is 510 MW.

Hydroelectric power is the oldest means of using energy. The principle is simple: All it needs is water and a head (i.e., difference in vertical height). The plant does not lead to flooding or resettlement of people. Run-of-river hydro power plants illustrate a great balance between utilizing a natural potential and low environmental and social impact.

The project provides several co-benefits that are aligned to the UN Sustainable Development Goals (SDGs). These include developing health facilities, establishing schools, improving water supplies, providing e-classrooms, employing locals, access to sustainable energy sources and mitigating global warming. The various activities undertaken by the project proponent on various areas and positively impacting the outcomes against several SDGs are summarized below.

- a) Provide access to healthcare facilities and services to community

¹ http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_323M30IDF1IH6AG3GRCJ4PKR9CKM7P

- i. Vaccination facility
 - ii. Medical Camps
 - iii. Provide accessible health care
- b) Provide access to education
 - i. Providing e-classrooms and infrastructure support
 - ii. Teaching assistance in the form of digital classrooms

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1	4.4	4.4.1 Information and communications technology (ICT) skills	Implemented activities to increase	The project proponent has invested in the establishment of Digital Classrooms with computer lab facilities at High Schools in South/ East Sikkim, through the approved DPR and an MOU was signed with district administration for CSR sustainability and avoiding overlapping of Govt. Funding. Through this initiative the following benefits can be observed: 1. There is an availability of digital accessories for all students. 2. The children would learn to operate the computer	The project includes development of school infrastructure by providing children with Digital Classrooms and computer lab facilities. One particular High School South and East Sikkim through the approved DPR and MOU (signed on 8th March 2014) benefitted from this initiative. The project of providing children with digital classrooms has lasted for 5 years. This initiative completed during 2014-2015 1. The number of students who would be benefitted from the initiative is 99 children per annum 2. The lifetime of the MoU is 5 years hence: $5 \times 99 = 495$ students have been benefitted from the project activity. 3. There is one school, which was benefitted from the project activity.

				with the help of a technical assistant 3. National level awards for teachers who teach using ICT 4. Students of various economic classes would be benefitted The number of students who would be benefitted from the initiative is 99 children per annum. Hence, the total number of students benefitted in the current monitoring period is $99 \times 4 = 396$.	4. Providing furniture, Audio system and sports items to the identified school of North/ East Sikkim. More details about the project activity can be seen in the appendix There were no contributions towards SDGs in the previous monitoring periods. Hence the total number of students benefitted during the current and previous monitoring periods are 495.
2	3.8	Indicator: Access to quality affordable and essential healthcare	Implemented activities to increase the access of the local stakeholders to affordable medical care.	The project activity intends to provide medical equipment to District and Sub District Hospital, By the signing of a Memorandum of Understanding with the District Authority for maintenance and Sustainability The assistance of NHPC has benefitted the hospitals by providing the hospitals with Horizontal Electric Autoclave	The MoU was signed, and the project activity is expected to last for 5 years and the current number of people benefitted from the activity are 1400 every year. It would benefit a total of $1400 \times 5 = 7000$ persons over the lifetime of the project.. Cost of the project: 10.3Lakhs in INR There were no contributions towards SDGs in the previous monitoring periods. Hence

				Rectangular, Electric Cautery (400 volts), Multichannel Cardiac Monitor with ETCO₂ monitoring, Dressing DRUM MEDIUM Size, Cataract Set complete, Fluid Warmer, Proceal LMA size 3,5, Ventilating boogies and Masks were supplied to the hospitals along with the help of District administration The total number of persons benefitted from the activity in the current monitoring period is $2 \times 1400 = 2800$.	persons benefitted during the current and previous monitoring periods are 7000.
2	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to decrease the emission of greenhouse gases in to the atmosphere.	The Teesta-V project replaces anthropogenic emissions of greenhouse gases GHGs into the atmosphere. Total of 11,776,268 tCO₂e during the current monitoring period, thereby generating 14,665,380 MWh using renewable energy. Hence displacing 14,665,380 MWh electricity from the grid	The Teesta-V project replaces anthropogenic emissions of greenhouse gases GHGs into the atmosphere. Total of 11,776,268 tCO₂e during the monitoring period 2012-2018, thereby generating 14,665,380 MWh using renewable energy. Hence displacing 14,665,380 MWh electricity from the grid The total anthropogenic emissions of green house gases replaced over the period of first verification period are 5,082,827 tCO₂e and second verification period are 11,776,268 tCO₂e. The total emission reductions over the 2 monitoring periods are 16,859,095 tCO₂e

2 SAFEGUARDS

2.1 No Net Harm

There were no harms identified from the implementation of the project. Hence no mitigations measures are required

As the project has previously not certified to the CCB or SD VSta Program, the conformance with the requirements set out in the Section 3.18 of VCS Standard version 4.4 is not applicable.

2.2 Local Stakeholder Consultation

A detailed stakeholder consultation process has been conducted by NHPC. This task was accomplished by the Land Use and Environmental Board, Forest Department. The Member Secretary has issued notice for environmental public hearing on 28th October 1997. The public hearing was conducted on 2nd December 1997 in the conference hall building, Forest Department, Government of Sikkim, Gangtok.

The stakeholders identified for the project activity are as follows:

1. Government Officials
2. Local Citizens
3. Representatives of affected people including women residing in the project area.
4. Representatives of Panchayats of villages
5. NGO representatives

The discussions mainly aimed at–

- The basic protection of the biodiversity and environment affected due to the project
- Social issues like rehabilitation, compensation and employment
- Issues of water availability and natural calamities were also discussed

1. Significant impacts in the region due to the project
2. Possible impacts in the long run
3. To understand various stakeholder perceptions
4. Stakeholder awareness of project related issues

The comments of various stakeholders are reviewed below:

- The entire region of the Sikkim state, which falls under the Eastern Himalayas, is a relatively fragile ecosystem, which is likely to be affected by any construction activity. But, this project has taken up proper mitigation measures through a well implemented Environmental Management Plan (EMP).
- To generate employment and prevent the influx of population in form of unskilled labourers, NHPC will only employ local labourers, and only in case of non availability will it hire from outside.

- The project has caused displacement of local families, but proper compensation is provided to them and any grievances have been solved.
- The project development has led to the anticipation of further developmental opportunities that will come up.
- The project area is under Zone IV seismicity, and proper earthquake parameters have been considered for the designing structures to prevent any calamity.
- That there are no apparent trends to indicate that the project has resulted in adversely affecting the livelihood, health, availability of water and other necessities of life in the region.

No major issue which would affect the life of the local community or raise any environment related problems in the region by the implementation of the project activity were identified during the discussion with stakeholders. All the minor issues were addressed and also the concerned departments are keeping a tight vigil for assessing any changes likely that may take place.

The PP also ensures that the interaction with the local stakeholders happens on a regular basis. The meeting with the local village panchayat is arranged at least once a month to get to know the issues in the village due to the project implementation and the PP helps out in whatever form deems fit.

2.3 AFOLU-Specific Safeguards

This section is not applicable as this project activity is non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity consists of three Hydal turbines of 170 MW capacities each totaling 510 MW and the electricity generated from the turbines is supplying to state grid.

The other entity involved has been changed to Core CarbonX Solutions Private Limited which is a consulting company for the verification of the project.

There have been a few instances in the monitoring period where the shut down of the plant was taken place. These were due to the repair works to the dam majorly. The detailed description of shutdown details have been given in the Appendix I of the monitoring report. It is to be noted that the source of meter readings during the shutdown periods is the energy meters. The data is published in the Grid Reports on a monthly basis by the ERLDC as mentioned in the deviation 1 in the MR.

On 24/12/2014, the main meter of Line 1, with meter number NP-5896-A, was replaced with meter number NP-8716-A due to the meter being faulty. The replacement was completed within one hour. The

readings were taken from the check meter instead and also when the faulty meter was being replaced. As the new meter data has been found correct and in line with the previous readings, there is no impact on the baseline emissions of the Project. The same has been mentioned in the Appendix II of the MR.

There has been no major interruption of equipment's, renovations or exchange of equipment's in the project activity during the current monitoring period. During the current monitoring period there no events and/or situations have occurred that may impact the applicability of the applied methodology.

The project activities commissioned dates are mentioned in below table;

S.No	Project Name	Technical Description of the Units	Date of Commissioning	Capacity
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2		Unit 2	25/02/2008	170 MW
3		Unit 3	03/04/2008	170 MW

Technical specifications 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
Head Race Tunnel (HRT)	
No.	1
Diameter and Height	25 m and 92 m
Design Discharge	292.37 cumec
Tail Race Tunnel (HRT)	
Type	D – Shaped
Length and Width	135 m and 6 m
Penstock	
Type	Vertical Pressure Shaft
No.	3
Design Discharge	97.45 cumecs (each)
Power House (Francis)	
Type	Underground
Design Discharge – 3 units	292.37 cumecs
Installed Capacity	510 MW
Gross Head	216.73 m
Net Head	197.57 m

3.2 Deviations

3.2.1 Methodology Deviations

Not Applicable

3.2.2 Project Description Deviations

Deviation 1:

In registered VCS PD, the export and import data would be monitored by the JMR/ Monthly Special Energy Meter Statement (SEM) from the energy meters. Nonetheless, project activity doesn't have JMR or monthly energy meter statement. Thus, deviation is requested to utilize source as "Deviation Settlement Account record" from the Grid Report published by Eastern Load Dispatch Center (ERLDC) for export/import parameter from 01-June-2012.

Justification:

1. NHPC declares available Hydal power plant capacity on ERLDC website (<https://erldc.in/>) by punching in data on a daily basis. This is called Declared Generation (DG).
2. ERLDC responds to NHPC's declared DG by punching in Scheduled Capacity of the Hydal plant on a daily basis, which is called Scheduled Generation (SG).
3. The energy-meter jointly installed by ERLDC and NHPC for Teesta-V Hydro Power Project in Sikkim by NHPC Limited, India, records and sends the actual daily generation (AG) to ERLDC on a daily basis through SCADA, measuring net sent out energy (net of auxiliary power consumption).
4. ERLDC (also called Power System Corporation of India POSOCO) publishes a daily generation report on its website mentioning DG, SG, AG and the deviation between AG and SG.
5. ERPC (Eastern Region Power Committee) settles these energy accounts on a weekly basis based on daily generation data published by ERLDC and publishes the weekly "Deviation Settlement Account" on <http://www.erpc.gov.in>. This information is considered as the final approved generation data of any power plant and is to be used for billing and payments. The same data is then released on a monthly basis as "Grid Report" for the respective month.
6. Actual Generation Data published by ERLDC on a daily basis is the actual generation.

The suggested deviations have no impact on the methodology's applicability, additionality, or appropriateness of the baseline scenario. Even though deviations are taken into account, the project activity meets the methodology's applicability criteria. Due to the proposed variation, there is no effect on the additionality. Even after the deviation is requested, the baseline scenario remains the same.

Deviation 2:

In registered VCS PD, in the section 3.2, it is mentioned that "- The meters recording the electricity exported will be calibrated at least once 3 years". However, The Central Electricity Authority (CEA) notification regarding Installation and Operation of meters regulations, 2006, says that meters are

required to be tested once in 5 years (refer clause 18 of the guideline)². Thus, deviation is requested to change the calibration frequency from 3 years to five years. The deviation does not have any impact on the applicability of the methodology, additionality or appropriateness of the baseline scenario.

Deviation 3:

In the registered VCS PD, section 1.15, it has been mentioned that “Emergent Ventures India Pvt Ltd” is another project participant. However, the “Emergent Ventures India Pvt Ltd” was the project consultants for the validation of the project and not the project participant. The project “TEESTA- V HYDRO POWER PROJECT IN SIKKIM” with project ID 766 has only one Project Proponent, i.e., NHPC Limited. The same is presented in the Registration Deed of Representation and previous year’s Issuance Deed of Representation on the Verra website³. As per section 1.4 of the MR, “Core CarbonX Solutions Private Limited”, is the other entity involved since Core CarbonX Solutions Private Limited was appointed as the consulting company (Other entity) for the verification of the project for the period 01-June-2012 to 31-March-2018 by the PP “NHPC Limited”(Contract No: GEMC-511687703033765, dated 29.09.2021 between NHPC Limited and Core CarbonX Solutions Private Limited). Thus, deviation is requested to change the other entity from “Emergent Ventures India Pvt Ltd” to “Core CarbonX Solutions Private Limited”.

The deviation does not have any impact on the applicability of the methodology, additionality or appropriateness of the baseline scenario.

3.3 Grouped Projects

The project activity is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Fixed ex-ante combined margin emission factor of NEWNE grid
Source of data	CO ₂ Baseline Database published by CEA, Version 04
Value applied	0.803
Justification of choice of data or description of	The value has been calculated as follows: $EF_{grid,CM,y} = 0.5 * EF_{OM,y} + 0.5 * EF_{BM,y}$ Where:

² CEA metering regulation clause 18 on page 12 of the regulation, The regulation is available on http://www.powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

³ <https://registry.verra.org/app/projectDetail/VCS/766>

measurement methods and procedures applied	$EF_{BM,y}$ = Build margin CO ₂ emission factor in year y (tCO ₂ /MWh) $EF_{OM,y}$ = Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
Purpose of Data	Calculation of baseline emissions
Comments	$EF_{grid,CM,y}$

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Net Electricity supplied to the grid by the project activity during the year y.
Source of data	Deviation Settlement Account statement from the Grid Reports issued by ERPC ⁴
Description of measurement methods and procedures to be applied	For the measurement of net energy delivered to the grid, energy meters (SEMs) are provided. The transmission lines have a set of main meter and check meter. Further one standby energy meter at 400 kV side of generator transformer is also provided. All these energy meters are special energy meters (accuracy class 0.2s). The meters are capable of metering export and import data separately. The net electricity delivered to the grid would be the difference of export and import energy. The monthly SEM statement forms the basis for calculation of the emission reductions. The Readings taken at the substation are taken in the presence of SEB officials and the PP representative. As per the deviation mentioned in section 2.2 of the report, the Deviation Settlement Account Statement from the Grid Report is used for the calculation of Electricity exported by the project to the grid at project site switch yard.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	14,665,380.00

⁴ For hydro projects, the PP need to provide schedule for electricity to be injected and based on electricity meters measured data, the actual injected electricity is monitored. There is some difference in scheduled electricity and injected electricity and the same is called as deviation. The state load dispatch centre issues statement on deviation also called as Deviation Settlement Account document.

The actual electricity drawn (i.e actual electricity supplied to grid) is measured parameter through electricity meters and that measured data is mentioned in the "Deviation Settlement Account document". The export energy meter details are mentioned in MR and these export energy meters are used to measure the Quantity of Electricity exported by the project to the grid.

Thus energy meters data is used for calculation of net electricity supplied to grid and same is in line with version 10 of methodology ACM0002. The deviation is requested for the source of data, and export parameter is measured through energy meters.

Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class ⁵
QA/QC procedures to be applied	Energy meters are calibrated once in a five year and no faulty meters were observed.
Purpose of the data	Calculation of baseline emissions
Calculation method	The deviation account settlement account statement.
Comments	The data is archived electronically and maintained for the entire crediting period plus two years

4.3 Monitoring Plan

NHPC adopts the following structure for data monitoring, collection, data archiving and calibration of equipment's for this project activity.

Data to be reported –

- Net Electricity Exported in MWh
- Periodical calibrations of monitoring equipment.

Origin of data and monitoring including estimation approach- The basis of the net electricity exported will be the Deviation Settlement Account statement from the Grid Reports issued by ERPC which are taken in the presence of Electricity Board personnel and a representative of the proponent every month.

Monitoring times and periods - The data will be monitored on a continuous basis but will be recorded on a monthly basis with the energy meters installed at the site. It is to be noted that the source of meter readings during the shutdown periods is the energy meters. The data is published in the Grid Reports on a monthly basis by the ERLDC as mentioned in the deviation 1 in the MR.

Data Accuracy - The meters recording the electricity exported will be calibrated at least once 3 years.

Calibration of meters- As per clause 4.0, Metering Arrangement of the Power Purchase Agreement (PPA) the metering arrangement including its installation, testing, maintenance and collection transportation and processing of data required for energy exchange shall be governed as per the notification/ directives issued/or to be issued by Central Electricity Regulatory Commission and as per relevant provisions contained in IEGC as amended from time to time. The Central Electricity Authority (CEA) notification regarding Installation and Operation of meters regulations, 2006, says that meters are required to be tested once in 5 years (refer clause 18 of the guideline)⁶.

Monitoring roles and responsibilities: A project team is constituted for the monitoring of the project. This team is responsible for data collection and archiving. The team meets periodically to review the data

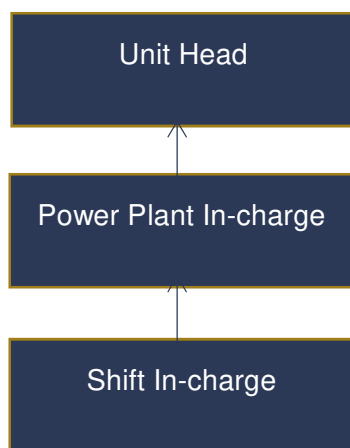
⁵ Energy meter details, accuracy, class, make and calibration details mentioned in Appexndix-1.

⁶ CEA metering regulation clause 18 on page 12 of the regulation, The regulation is available on http://www.powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

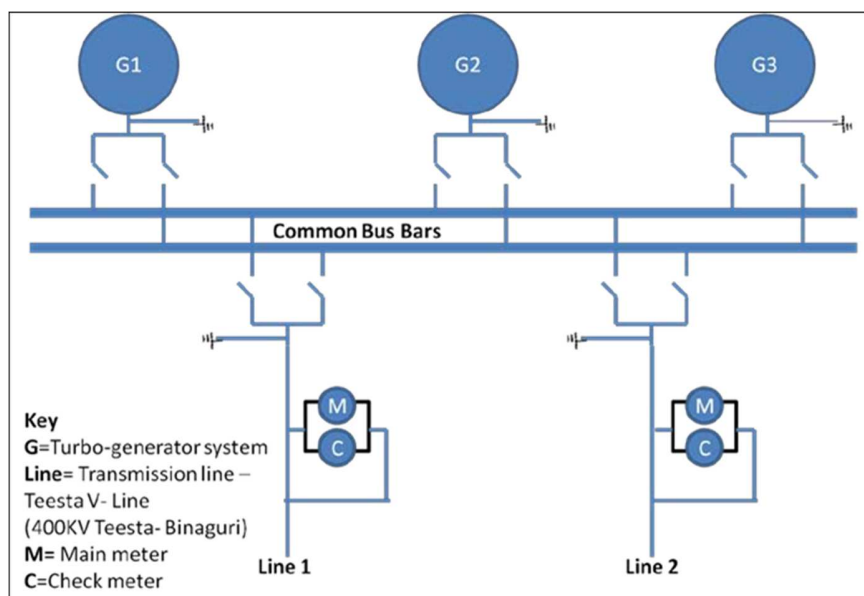
collected. In case of any irregularity observed by any of the team members, it is informed to the concerned person for necessary actions to be taken. The following is the team structure for project monitoring:

- **Unit Head:** Overall responsibility of compliance with the monitoring plan.
- **Power Plant In-charge:** Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation.
- **Shift In-charge:** Responsibility of daily report generation from the SCADA system/ log-books

Managing Data Quality: The Power plant In-charge would prepare the report pertaining to the recorded values of the monitored parameters as by the shift-in-charge. The day to day records would be verified by Unit Head, compiled and documented. The company will introduce a safe storage of data. NHPC is an ISO – 9000, and ISO – 14000 certified company having an integrated management system. It will ensure also requirements are met for the project also.



Line diagrams showing all relevant monitoring points:



Training: Need based training sessions are being organized for the staff and training details are being recorded and made available in document.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions due to displacement of grid electricity (BE_y) are the product of the baseline emission factor (EF_y) times the electricity supplied by the project activity to the grid (EG_y), over the monitoring period.

Calculation for baseline emissions for the complete monitoring period:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where,

$EF_{grid,CM,y}$ = Combined Margin CO_2 emission factor in year y

$EG_{PJ,y}$ = Net electricity supplied to the NEWNE regional grid (MWh)

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

$$= 14665380 \times 0.803$$

= 11,776,268 tCO₂e

Period	Net Electricity generation (MWh)	Baseline emission factor (tCO ₂ e/MWh)	Baseline Emissions (tCO ₂ e)
01/06/2012 - 31/12/2012	1,529,600	0.803	1,228,265
01/01/2013 - 31/12/2013	2,326,500	0.803	1,868,174
01/01/2014 - 31/12/2014	2,340,400	0.803	1,879,336
01/01/2015 - 31/12/2015	2,614,500	0.803	2,099,439
01/01/2016 - 31/03/2016	2,782,780	0.803	2,234,566
01/01/2017 - 31/12/2017	2,819,700	0.803	2,264,214
01/01/2018 - 31/03/2018	251,900	0.803	202,274
Total	14,665,380		11,776,268⁷

5.2 Project Emissions

The project emission calculation as per the methodology includes the CH₄ emission from the reservoir. However, since the project activity does not involve the installation of a new reservoir, it does not result in any project emissions.

Thus, PE_y=0.

5.3 Leakage

As specified in ACM0002, the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation.

Since no such activities have taken place, the project participants do not need to consider leakage in applying this methodology.

Thus L_y = 0

5.4 Net GHG Emission Reductions and Removals

The emission reductions ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows.

$$ER_y = BE_y - PE_y - L_y$$

⁷ Baseline emission reductions are rounded down.

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

L_y = Leakage emissions in year y (t CO₂e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = BE_y - PE_y - L_y$$

$$ER_y = 11,776,268 - 0 - 0 = 11,776,268 \text{ tCO}_2$$

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2012(01-June-2012 – 31-December-2012)	1,228,265	0	0	1,228,265
2013 (01-January-2013 – 31-December-2013)	1,868,174	0	0	1,868,174
2014 (01-January-2014 – 31-December-2014)	1,879,336	0	0	1,879,336
2015 (01-January-2015 – 31-December-2015)	2,099,439	0	0	2,099,439
2016 (01-January-2016 –	2,234,566	0	0	2,234,566

31-December-2016)				
2017 (01-January-2017 – 31-December-2017)	2,264,214	0	0	2,264,214
2018 (01-January-2018 – 31-March-2018)	202,274	0	0	202,274
Total	11,776,268	0	0	11,776,268

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
11,930,579	11,776,268	-1.29%	Shutdown of the plant for repair works at the dam during the monitoring period. The details of the same have been given in the appendix I under the title “Shutdown Details of the Project”.

APPENDIX I: < SHUTDOWN DETAILS OF THE PROJECT >

The shutdown details all units of the project activity are given below:

Year	Period		Number of days	Details
	From	To		
2012	1-Jun-12	10-Jun-12	12	OUTAGE OF U#3 FOR RECTIFICATION OF GEN. TRANSFORMER (B- PHASE) AFTER BUCHHOLZ RELAY ALARM
	9-Aug-12	10-Aug-12	2	OUTAGE OF U#3 FOR RECTIFICATION OF LEAKAGE IN PRESSURE BALANCING PIPE.
	19-Aug-12	20-Aug-12	2	OUTAGE OF U#2 FOR RECTIFICATION OF LEAKAGE IN PRESSURE BALANCING PIPE.
	18-Sep-12	22-Sep-12	5	OUTAGE OF U#2 FOR RECTIFICATION OF LEAKAGE IN SHAFT SEAL.
	29-Sep-12	30-Sep-12	2	OUTAGE OF U#1 FOR RECTIFICATION OF LEAKAGE IN PRESSURE BALANCING PIPE.
	7-Nov-12	11-Nov-12	5	COMPLETE SHUTDOWN OF POWER STATION FOR MAINTENANCE WORK IN HM GATES OF DAM
	1-Dec-12	3-Dec-12	3	
2013	26-Feb-13	28-Feb-13	3	
2014	4-Jan-14	31-Jan-14	28	COMPLETE SHUTDOWN OF POWER STATION FOR REPAIR WORKS AT DAM
	1-Feb-14	28-Feb-14	28	
	1-Mar-14	6-Mar-14	6	
Total Number of shut down days			96 ⁸	

⁸ It is evident that the total shut down days were 96 during the monitoring period of 5 years 10 months. The same can be cross-checked in the ER sheet. The generation is zero for February 2014, which can also be cross-checked with the ER sheet.

APPENDIX II: METER CALIBRATION DETAILS

The energy meter details along with calibration details are given below:

Location	Meter Number	New Meter Number	Type	Accuracy Class	Make of Meter	Calibration Frequency	Calibration Dates
Main Meter (Teesta V – Line 1)	NP – 5896 – A	NP – 8716 – A ⁹	ER300P	0.2s	L&T	Once in five years	24/12/2014 (New Meter) 08/02/2014 13/12/2010 12/10/2006
Check Meter (Teesta V – Line 1)	NP – 5895 – A	Not changed	ER300P	0.2s	L&T	Once in five years	08/02/2014 13/12/2010 12/10/2006
Main Meter (Teesta V – Line 2)	NP – 5898 – A	Not changed	ER300P	0.2s	L&T	Once in five years	08/02/2014 13/12/2010 12/10/2006
Check Meter (Teesta V – Line 2)	NP – 5897 – A	Not changed	ER300P	0.2s	L&T	Once in five years	08/02/2014 13/12/2010 12/10/2006

There was a change in energy meter in Line 1. The meter number NP-5896-A has been replaced by meter number NP-8716-A due to the meter being faulty. Since, the meters are under the control of PGCIL, they have replaced the faulty meter with the new meter. The readings were taken from the check meter when the faulty meter was being replaced. As the new meter data has been found correct and in line with the previous readings, there is no impact on the baseline emissions of the Project.

⁹ The main meter of Line 1 with the serial number NP-5896-A was replaced with the meter with serial number NP-8716-A with the accuracy class of 0.2S on 24/12/2014 (replaced in one hour) due to the meter being faulty. The meter replacement certificate has been submitted to the VVB.

APPENDIX III: CSR ACTIVITIES TAKEN UP BY THE PROJECT PROPONENT

The CSR activities taken up by NHPC Limited under Teesta V Hydro Power project are accessible through the following link. The CSR reports for every year are given in the below link:

Web-Link: <http://www.nhpcindia.com/Default.aspx?id=525&lg=eng&>

Sector	CSR Activities Undertaken	Expenditure
		In Lakh (INR)
Education	Establishment of Digital Smart Class Rooms with computer lab along with accessories at HS Wanpora, Gurez through the approved DPR and MOU with district administration for CSR sustainability and avoiding overlapping of Govt. Funding (Project Cost is Rs.16.36 lakhs, Expenditure incurred Rs.3.27 lakhs)	13.09
	Establishment of ITI Sikkim	300
Health and Sanitation	Organizing Medical Camps (Minimum 2-3 camps or as per medical requirements in one or two focused locations on regular intervals for sustainable healthcare)- at South and East Sikkim Locations.	14.33
COVID-19 Emergent Activities	Covid-19 emergency medical items (from Reserve Fund)	0.9
Rural Development	Installation of 10 Nos High Mast Solar Lights with Five (05) years maintenance for Gurez (4 x40 Watt) through the approved DPR and MOU with district administration/ for CSR sustainability and avoiding overlapping of Govt. Funding. (Project cost 17.00 Lakh)	13.6
	Repair, Restoration and Cleaning of Kuls, Culverts and Footpaths for nearby villages-Kralpora, Check,	1.84

	Mantrigram, Chandaji and Gurez through district administration with MOU route for CSR Sustainability and overlapping of Govt. Funding.	
	Repair and maintenance of Kuls in nearby villages subject to approved DPR, all clearances from Distt. Authority and MOU with District authority for maintenance and sustainability.	19.1
	Repair and maintenance of local water supply line in nearby villages such as Karalpora, Mantrigram, Chandaji and Check subject to approved DPR, all clearances from Dist. Authority including non-overlapping of this activity and MOU with District authority for sustainability	0.46
Environment	Solar Street Lights in Check Village B.	2.00
Sports	Strengthening by way of training and material for local sports, art & culture through the approved DPR and MOU with district administration for CSR sustainability and avoiding overlapping of Govt. Funding.	2.41
Disaster Management	CSR support to Fire effected families of sikkim district for purchase of CGI Sheets and blankets	2.22
	Total	369.95