



**Verified Carbon
Standard**

TEESTA LOW DAM PROJECT, STAGE – IV



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 Low Dam Project, Stage-IV is Greenfield Hydro Power Project located on Teesta River near village Kalijhora, Darjeeling district of West Bengal state of India.

It is a run of the river scheme in the lower cascade of river Teesta. It will have an installed capacity of 160 MW. The dam is a concrete gravity structure approx. 45 m high from deepest foundation level. The surface powerhouse is to be equipped with four number Kaplan turbines each having a capacity of 40 MW and is proposed to be utilised to generate 720 MU of electricity every year.

The purpose of the project activity is to generate electrical power using hydel energy, through the operation of run of the river hydro turbines. The hydel energy generated from the hydel power plant is evacuated to the State Grid System which is part of NEWNE Grid now Indian National Grid.

Generating power through hydel plant is a clean technology as no Carbon intensive fossil fuel is burnt during the process. A hydel turbine produces power by harnessing the available potential energy. Thus, there are no GHG emissions associated with the functioning of the hydro turbines. This in result replaces anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 696,816 tCO_{2e} per year, thereon displacing 720,000 MWh/year amount of electricity from the grid.

In the Pre- project scenario the entire 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.

The details of the project are as follows.

Project Name	Unit No.	Turbine Capacity	Location	Commissioning Date
Teesta Low Dam Project, Stage-IV	I	40 MW	Kalijhora, Darjeeling (W.B)	14-Feb-2016
	II	40 MW	Kalijhora, Darjeeling (W.B)	16-Mar-2016
	III	40 MW	Kalijhora, Darjeeling (W.B)	03-Jul-2016
	IV	40 MW	Kalijhora, Darjeeling (W.B)	11-Aug-2016

The monitoring period for this project activity is from 17-Jul-2017 to 31-Mar-2021. The total GHG emission reductions or removals generated in this monitoring period are 2,327,228 tCO₂.

Audit Type	Period	Program	VVB Name	Number of years
Validation	17-Mar-2016	<u>VCS</u>	<u>Earthood Services Private Limited</u>	10 Years
Verification	14-Feb-2016 - 16-July-2017	<u>VCS</u>	<u>Earthood Services Private Limited</u>	1 Year 5 Months
Verification	17-July-2017 - 31-Mar-2021	<u>VCS</u>	<u>LGAI Technological Center, S.A</u>	3 Years 9 Months
Total	<u>14-Feb-2016 - 31-March-2021</u>	<u>VCS</u>	=	5 Years 1 Month

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope: 01 - Energy industries (renewable / non-renewable sources)

Project Type: I - Renewable Energy Projects

The project is not a grouped project.

1.3 Project Proponent

Organization name	NHPC Ltd
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	Physical Address: 5R, Block-A, #6-3-668/9, Kanthi Shikara Complex, Punjagutta, Hyderabad-500082, Telangana, India
Telephone	040-23410367
Email	nmohanty@corecarbonx.com and info@corecarbonx.com

1.5 Project Start Date

Project start date: 14-Feb-2016

The project start date is the earliest commissioning date amongst all the four Hydro Turbine Units which are part of this Large Scale Hydro power project.

Project Name	Unit No.	Turbine Capacity	Location	Commissioning Date
Teesta Low Dam Project, Stage-IV	I	40 MW	Kalijhora, Darjeeling (W.B)	14-Feb-2016
	II	40 MW	Kalijhora, Darjeeling (W.B)	16-Mar-2016
	III	40 MW	Kalijhora, Darjeeling (W.B)	03-Jul-2016
	IV	40 MW	Kalijhora, Darjeeling (W.B)	11-Aug-2016

1.6 Project Crediting Period

Crediting Period Start date: 14-Feb-2016

Crediting Period End date: 13-Feb-2026

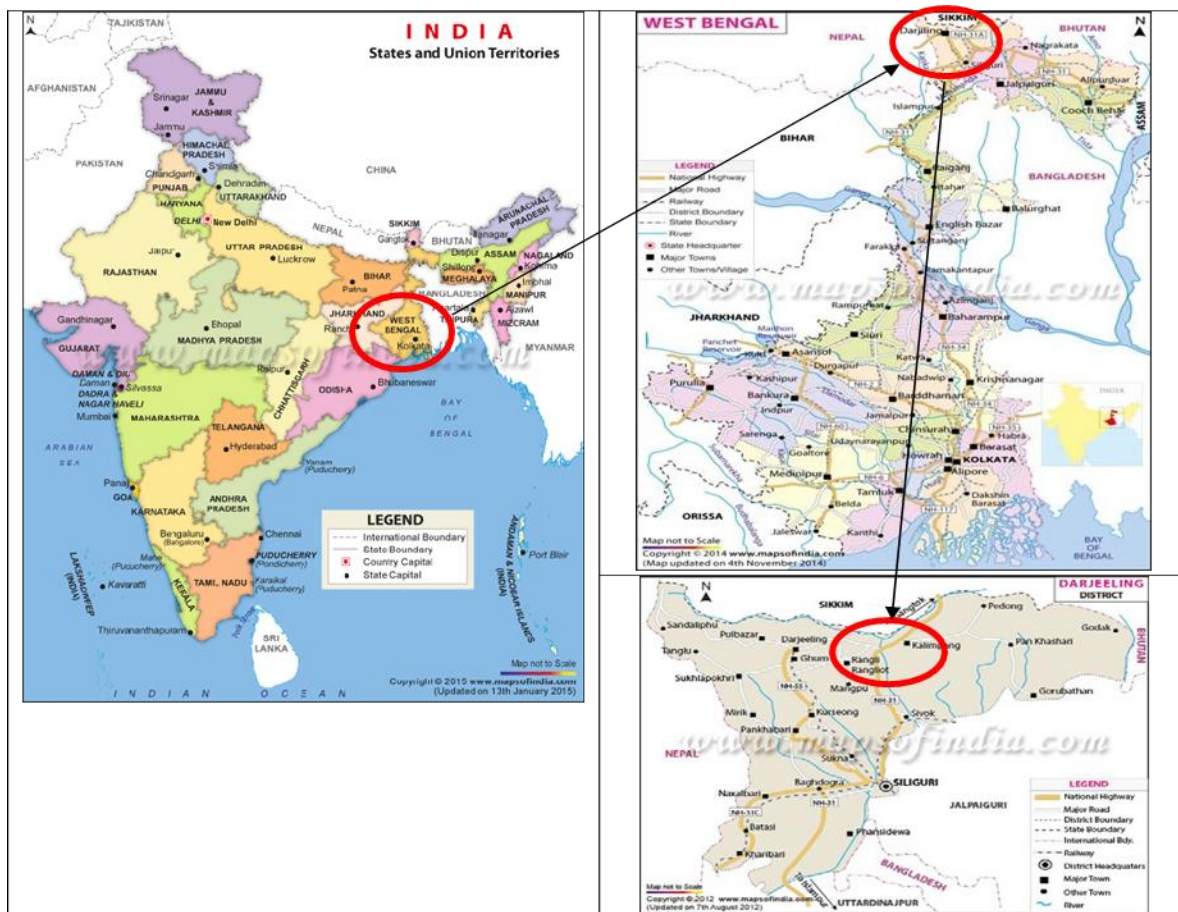
Total number of years: 10.

1.7 Project Location

The Teesta Low Dam Project, Stage IV (4x40MW) is located on Teesta River near Kalijhora village in Darjeeling district of West Bengal state of India. The geographical co-ordinates of the project activity are as follows.

Location	Latitude	Longitude
TLDP Stage IV	26.9273 N	88.4553 E

The map below shows the exact location of the project activity:



1.8 Title and Reference of Methodology

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0,
 Sectoral Scope: 01, EB 81, Annex 9
<https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:

1. Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8
<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>
2. Tool to calculate the emission factor for an electricity system --- Version 04.0, EB 75, Annex 15
<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

1.9 Participation under other GHG Programs

The project has not been registered in any other GHG programs.

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

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

1.11 Sustainable Development Contributions

The Teesta Low Dam Project, Stage-IV is a Greenfield Hydro Power Project located on the Teesta River near village Kalijhora, Darjeeling district of West Bengal state of India. It is a run of the river scheme in the lower cascade of river Teesta. It will have an installed capacity of 160 MW. The surface powerhouse is to be equipped with four number Kaplan turbines each having a capacity of 40 MW and is proposed to be utilised to generate 720 MU of electricity every year.

This project provides several co-benefits that are aligned to the United Nations' Sustainable Development Goals (SDGs). These include developing health facilities, establishing schools, improving water supplies, 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) Provides access to healthcare facilities and services to community
 - Trained Medical Doctor and Staff
 - Provide accessible, affordable and available healthcare to everyone
- b) Provide access to education
 - Provision of Digital Equipment
 - Distribution of Scholarships

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	4.1	Indicator: Providing Quality Education to Children	Implemented activities to increase	The project proponent includes distribution of scholarships to students to assist in their education/ tuition fee. Development of engineering college, providing infrastructure to schools. Assisting NGO's financially in giving special chairs to disabled children. Providing economic assistance to employ more teachers and cleaners. Provide economic assistance during the monitoring period has benefitted more than 500 students. Pupils have improved their analytical, reasoning, reading and writing skills after the financial assistance. Please refer to page 3 on this report for expenditure on each student https://www.cbgaindia.org/wp-content/uploads/2019/03/Budgeting-for-School-Education-in-West-Bengal.pdf	The project proponent includes distribution of scholarships to students to assist in their education/ tuition fee. Development of engineering college, providing infrastructure to schools. Assisting NGO's financially in giving special chairs to disabled children. Providing economic assistance to employ more teachers and cleaners. Provide economic assistance during the monitoring period has benefitted more than 500 students. Pupils have improved their analytical, reasoning, reading and writing skills after the financial assistance. Please refer to page 3 on this report for expenditure on each student https://www.cbgaindia.org/wp-content/uploads/2019/03/Budgeting-for-School-Education-in-West-Bengal.pdf. The average expenditure spent on each student is estimated to be around Rs. 6404/- all these initiatives have helped more than 500 students increase their proficiency in

<content/uploads/2019/03/Budgeting-for-School-Education-in-West-Bengal.pdf>. The average expenditure spent on each student is estimated to be around Rs. 6404/- all these initiatives have helped more than 500 students increase their proficiency in reading. So the project proponent has spent 130.2 Lakhs INR in providing quality education to local children in that area.

reading. So the project proponent has spent 130.2 Lakhs INR in providing quality education to local children in that area.

Activity	Expenditure in Lakhs INR
Engineering College at Tadakh	100
Scholarship	10.9
Infrastructure aid to NGO for physically disabled children	4.28
Development of science lab at Latpanchor HS	1.72
Infrastructure aid to schools	2.66
Construction of playground near High School at Tadakh	2.42
Economic assistance for voluntary cleaners	8.22

					<table><tr><td>and assistant teacher</td><td></td></tr><tr><td>Total Expenditure</td><td>130.2</td></tr></table> There were no SDG contributions from the project activity in the previous monitoring period.	and assistant teacher		Total Expenditure	130.2
and assistant teacher									
Total Expenditure	130.2								
2)	8.3	Indicator: Increase the employment rate through skill development training	Implemented activities to increase the employment opportunities for the local stakeholders	The project proponent involved fireman trade skill training for youth As a part of this program by NHPC, the workers were trained by reputed government institutions and they were certified as skilled firemen Skill Development Course: The course duration is 6 months The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of National Council of Vocational Training (NCVT). Craftsman	The project proponent involved fireman trade skill training for youth As a part of this program by NHPC, the workers were trained by reputed government institutions and they were certified as skilled firemen Over the course of project lifetime, one course per year would be sponsored by the project proponent. Hence, a total of 10 courses would be sponsored.				

				Training Scheme (CTS). The supporting document link for more details of the skill development and training is: https://www.nqr.gov.in/sites/default/files/Curriculum%20-%20Fireman.pdf NHPC has facilitated the fireman course for 4 years in the current monitoring period.	
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase.	The TLDP-IV project replaces anthropogenic emissions of greenhouse gases GHGs into the atmosphere. Total of 2,327,228 tCO₂e during the current monitoring period, thereby generating 2,404,658.7609MWh using renewable energy. Hence displacing 2,404,658.7609MWh electricity from the grid	The TLDP-IV project replaces anthropogenic emissions of greenhouse gases GHGs into the atmosphere. The total anthropogenic emissions of green house gases replaced over the period of first verification period are 805,717 tCO₂e and second verification period are 2,327,228 tCO₂e. The total emission reductions till date are 3,132,945 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 versión 4.4 is not applicable.

2.2 Local Stakeholder Consultation

NHPC has established an Environment Management Group under the Planning Division of Corporation, which looks after monitoring and implementation of environmental safeguards at project and corporate level. Also with respect to the latest guidelines issued by the MoEF, Govt. of India, an Environmental Management Cell is proposed for the planning and implementation of Environmental Management Plan. Under the rehabilitation and resettlement, affected families are provided with a compensatory package. Also there are plans for development of green belt around the project area and a compensatory afforestation plan is to started to cover a land area along with the development of Catchment Area and Treatment (CAT) plan for the overall conservation of surrounding ecosystem.

The stakeholders participated in the Public Hearing 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.
- Significant impacts in the region due to the project
- Possible impacts in the long run.
- To understand various stakeholder perceptions.
- Stakeholder awareness of project related issues

The comments of various stakeholders are reviewed below:

- The entire project region 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 lead to the anticipation of further developmental opportunities that will come up.
- For the project area 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

The project does not fall under the category of AFOLU projects. Hence, this section is not applicable

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Teesta Low Dam Project, Stage IV (4x40MW) is located on Teesta River near Khalijhora village in Darjeeling District of West Bengal.

The start date of the project activity is 14-Feb-2016 which is the commissioning date of Unit-I.

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 has been complete shutdown of the power plant in 2017 due to agitations due to the Gorkha land Agitators for two months (13-July-2017 to 14-September-2017). There also has been interruption in energy generation due to repair of thrust breakers of Unit 3 in 2019 for almost 3 months (21-March-2019 to 11-June-2019). There were no significant renovations or exchange of equipment in the project activity during the current monitoring period. There were no circumstances that occurred during the current monitoring period that may impact the applicability of the applied methodology.

The project activities commissioned dates are mentioned in below table;

Project Name	Unit No.	Turbine Capacity	Location	Commissioning Date
Teesta Low Dam Project, Stage-IV	I	40 MW	Kalijhora, Darjeeling (W.B)	14-Feb-2016
	II	40 MW	Kalijhora, Darjeeling (W.B)	16-Mar-2016
	III	40 MW	Kalijhora, Darjeeling (W.B)	03-Jul-2016
	IV	40 MW	Kalijhora, Darjeeling (W.B)	11-Aug-2016

Salient features of the project:

1	LOCATION	
	State	West Bengal
	District	Darjeeling
	River	Teesta
	Dam site	18.3 Km downstream of Teesta Bridge on NH31A
	Power House site	50M downstream of Dam Axis on the Left Bank
2	HYDROLOGY	
	Catchment area	8021 Sq. Km.
3	RESERVOIR	
	Full Reservoir Level (FRL)	EL 182.25 m
	Min. Draw Down Level (MDDL)	EL 179.0 m
	Gross Storage	36.63 MCM
	Live Storage	7.91 MCM
	Area under submergence at FRL	257.26 Ha
4	DAM	
	Type	Concrete Gravity / RCC
	Top Elevation	EL 185.00 m
	Length at the top	521 m
	Height of dam above river bed level	± 30 m
	Height of dam above deepest foundation level	± 45 m
5	SPILLWAY	
	Design flood	15400 cumecs (PMF)
	Type	Sluice type with breast wall
	Crest elevation	EL 157 m

	Number & size of spillway opening	7 no.s, 11 m (W) x 17 m (H)
6	DIVERSION CHANNEL	
	No. of channels	
	Length	± 700 m
7	INTAKE	
	Invert level	EL 165.50 m
	Number of intakes	4 No.s
	Gate opening	7 m (W) x 7 m (H)
8	PENSTOCK	
	Number	Four
	Shape	Circular, Steel Lined
	Length	± 45 m each
	Diameter	7 m
9	POWER HOUSE	
	Type and location	Surface; Left Bank
	Design discharge	716.00 cumecs
	Type of turbine	Kaplan
	Installed capacity	4 x 40 MW
	Power house size	134 m x 24.5 m x 66 m
	Gross head	25.76 m
	Rated net head	25.05 m
10	TAIL RACE CHANNEL	
	Shape	Trapezoidal
	Bottom Width	100 m
	Length	98 m
	Weir Level	EL 152.12 m
11	SWITCHYARD	
	Size and location	200 m x 95 m on Left Bank at EL ± 215.00 m

3.2 Deviations

3.2.1 Methodology Deviations

There were no methodological deviations applied to the project activity during this monitoring period.

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" for export/import parameter.

Justification:

- NHPC declares available Hydel power plant capacity on ERLDC website (<https://erldc.in/>) by punching in data on a daily basis. This is called Declared Generation (DG).

- ERLDC responds to NHPC's declared DG by punching in Scheduled Capacity of the hydel plant on a daily basis, which is called Scheduled Generation (SG).
- The energy-meter jointly installed by ERLDC and NHPC for Teesta Low Dam Project, Stage-IV Hydro Power Project in Darjeeling, 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).
- 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.
- 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.
- Actual Generation Data published by ERLDC on daily basis is the actual generation

Deviation – 2:

The project activity involves Import parameter as a monitoring parameter and PP has monitored this parameter. However, the calibration reports of import meters are not available with the PP. Hence, deviation is requested as PP does not have the calibration certificates for the import meters. Maximum permissible error factor has been applied to the import data as per CDM guidelines as a conservative approach.

Justification:

- The calibration of the import meters is not under the control of PP.
- As per VCS Registered PD, "The Import meters will be calibrated and maintained by state electricity Board", but the PP do not have import meters calibration certificates.
- Since there is monetary transaction involved, and PP need to pay to state electricity Board for import of electricity, the state electricity board ensures that the meters are running accurately. PP does not have any role for calibration of the meters.
- The decision of calibrating the import meters lies in the hands of the state electricity board. The state electricity board does not share the calibration certificates with the PP for import meters and this is common practice followed by them.
- Since the calibration certificates are not available with PP, as a conservative approach, the maximum permissible error factor is applied to the import data as per the CDM guidelines.

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.

3.3 Grouped Projects

This project is not a grouped project. Hence, this section is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ¹
Value applied	0.9862 (NEWNE Grid now Indian National Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” as 3-year generation weighted average using data for the years 2011-12, 2012-13 & 2013-14. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India
Purpose of Data	For the calculation of the Baseline Emissions
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9495 (NEWNE Grid now Indian National Grid)

¹ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” for the year 2013-2014. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India
Purpose of Data	For the calculation of the Baseline Emissions
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9678 (NEWNE Grid now Indian National Grid)
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: EF_{grid,BM,y} = Build margin CO₂ emission factor in year y (tCO₂/MWh) EF_{grid,OM,y} = Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 50% W_{BM} = Weighting of build margin emissions factor (%) = 50%
Purpose of Data	For the calculation of the Baseline Emissions
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

Source of data	Energy Meters ²
Description of measurement methods and procedures to be applied	Net electricity supplied to grid is calculated as: Net electricity generated and supplied by the project plant/unit to the grid = Electricity exported by the project to the grid at project site switch yard – Electricity imported by the project from the grid at interconnection point of the Regional Supply. $EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	2404658.7609
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class ³
QA/QC procedures to be applied	Net electricity supplied to grid is a calculated value. Therefore QA/QC is provided for individual parameters $EG_{Export,y}$, $EG_{Import,y}$: $EG_{Export,y}$ is sourced from the deviation settlement account statement published by Northern Regional Power Committee as mentioned in deviation (section 3.2 of MR) $EG_{Import,y}$ is sourced from the certified electricity bills from State Electricity Board, which is a government organization responsible for monitoring the electricity, thus the values are authentic and credible as mentioned in deviation
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$
Comments	NA

² 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 a difference in scheduled electricity and injected electricity and the same is called as deviation. The state load dispatch centre (WB) West Bengal State Electricity Transmission Company Limited (A Govt. of W.B Enterprise) issues statement on deviation also called as Deviation Settlement Account document.

The actual electricity injected (i.e actual electricity supplied to grid) is measured 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 16 of methodology ACM0002. The deviation is requested for the source of data, and export parameter is measured through energy meters.

³ The energy meters make, class and calibration details are mentioned in the appendix 1.

Data / Parameter	EG _{Export,y}
Data unit	MWh
Description	Quantity of Electricity exported by the project to the grid at project site switch yard in year y
Source of data	Deviation Settlement Account Statement as mentioned in deviation
Description of measurement methods and procedures to be applied	Electricity exported by the project to the grid at project site switch yard is the Net Transmitted Units recorded and monitored by the metering system installed at the project site switch yard. The metering system comprises of four individual special energy meters (SEMs) (acts as standby meters) for each generating units. These are connected via two transmission lines of 220 kV, each having its own SEM meter (main meter and check meter). In case, anyone transmission line is not in service than complete load is shifted to other transmission line which is in operation. The PP is currently developing the third transmission line for measuring the electricity exported by the project to the grid. The third line is yet to be commissioned and it is not under consideration during the current monitoring period. The energy meters are tri-vector meter which are installed and sealed by the Power Grid Corporation Limited in the presence of the representatives of the power producer. The energy meters have capacity of recording both import & export; however net transmitted units are recorded & monitored. The monthly reading of electricity transmitted from the meters installed at the project site switch yard are jointly taken by the representatives of the power producer and SEB official and this data is used for billing purposes. The check meter is used during the period the main metering system is not in service. Further, in case of failure of main meter and check meter, sum of the net electricity generation recorded by four individual special energy meters (SEMs) and individual auxiliary meters is used for accounting and billing purpose. As per the deviation mentioned in section 3.2 of the report, the Deviation Settlement Account Statement is used for the calculation of Electricity exported by the project to the grid at project site switch yard. Electricity exported by the project to the grid at project site switch yard is calculated as:

	Electricity exported by the project to the grid at project site switch yard = "Net Transmitted Units recorded by L1 _{Main Meter} " + "Net Transmitted Units recorded by L2 _{Main Meter} "
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	2409461.8138
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class
QA/QC procedures to be applied	Energy meters are calibrated once in a five year and no faulty meters were observed. EG_{Export,y} Can be cross checked from Monthly Generation Report. The Monthly generation report gives the gross generation by the project activity and this monthly generation report value is higher than export value mentioned in deviation Settlement account document.
Purpose of the data	Calculation of baseline emissions
Calculation method	The deviation Settlement account statement mentioned collectively total export of all units and all transmission lines.
Comments	The data is archived electronically and maintained for the entire crediting period plus two years.

Data / Parameter	EG _{Import,y}
Data unit	MWh
Description	Quantity of Electricity imported by the project from the grid at interconnection point of the Regional Supply in year y
Source of data	Monthly electricity sales bills raised by State Electricity Board
Description of measurement methods and procedures to be applied	The Project activity has two 11kV Electricity Supply line from State Electricity Boards system which is used to import electricity during start-up, shutdown and the lean period. The Electricity imported during start-up, shutdown and the lean period is recorded and monitored. Especially, in winter season when the project is partially or totally unable to operate, the project draws energy required for startup and maintenance of the project from the State Electricity Boards system, which is metered at the interconnection point of the regional supply

	The data is recorded by duly tested and sealed meter installed by State Electricity Board. The meter is calibrated and maintained by State Electricity Board. Records of monthly electricity sales bills raised by State Electricity Board are used as evidence for power imported from the State Electricity Grid. Electricity imported by the project from the grid at interconnection point of the Regional Supply is calculated as Electricity imported by the project from the grid at interconnection point of the Regional Supply = "Electricity Consumption from Regional Supply - 1" + "Electricity Consumption from Regional Supply - 2"
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	4803.0529
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class
QA/QC procedures to be applied	The deviation has been requested for non-availability of calibration certificates for import meters due to no control of PP and conservative approach followed with application of maximum permissible error factor as mentioned in deviation request. $EG_{Import,y}$ is sourced from the monthly electricity sales bills raised by State Electricity Board
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{Import,y}$ is sourced from the document certified by state electricity board.
Comments	The data is archived electronically and maintained for the entire crediting period plus two years.

4.3 Monitoring Plan

The project proponents at the power station have a procedure to ensure proper monitoring of the VCS project activity. The project activity has installed monitoring and control equipment that measure, record, report, monitor and control various key parameters.

The methodology requires monitoring of the net electricity supplied from the project activity. The proponent maintains complete and accurate records and all other data required for the purpose of proper administration and operation of the hydro power plant. The data is kept for at least 2 years after the end of the crediting period.

1. **Purpose-** The purpose of monitoring the project is to assess the annual emission reductions in tonnes of CO₂ that the project activity has achieved.
2. **Data to be reported-** EG_{export} & EG_{import} in MWh and periodical calibration of all the monitoring equipment.
3. **Origin of data and monitoring including estimation approach-** Net electricity generated and supplied to grid is a calculated value whereas EG_{export} is sourced from deviation Settlement account statement and EG_{import} is sourced from Monthly electricity sales bills raised by State Electricity Board.

Deviation has been taken in this case for sourcing of the export generation values. The same can be referred from the section 3.2.2 of the Monitoring Report.

4. **Monitoring times and periods-** The data is monitored on a continuous basis but is recorded on a monthly basis with the energy meters installed at the site.
5. **Data Accuracy-** 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 is 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)⁴ . Thus, the meters recording the electricity exported are calibrated at least once in 5 years.
6. **Emission Reduction Calculation Approach-** The emission reductions are calculated as a product of the net electricity generated from the project activity and the combined margin emission factor. The calculation approach is explained in detail under section 3 of this document.
7. **Monitoring roles and responsibilities-** The team is competent enough to monitor the data. A project team has been constituted for the monitoring of the project. This team is responsible for data collection and archiving. The team meets periodically to review the data collected as per section 5. 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:

- a. **Unit Head:** Overall responsibility of compliance with the monitoring plan.
- b. **Power Plant In-charge:** Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation

⁴ CEA metering regulation clause 18 on page 12 of the regulation
http://www.powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

c. **Shift In-charge:** Responsibility of daily report generation from the SCADA system/ logbooks.

8. **Managing Data Quality-** the Power plant In-charge prepares the report pertaining to the recorded values of the monitored parameters as by the shift-in- charge. The day to day records are verified, compiled and documented by Unit Head. The company has introduced a safe storage of data. NHPC is an ISO– 9000, and ISO– 14000 certified company having an integrated management system. It also ensures that requirements are met for the project as well.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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

Where,

$EF_{grid,CM,y}$ = Combined Margin CO₂ emission factor in year y

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

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

$$= 2404658.7609 \times 0.9678$$

$$= 2,327,228 \text{ tCO}_2\text{e}$$

Period	Net Electricity generation (MWh)	Baseline emission factor (tCO ₂ e/MWh)	Baseline Emissions (tCO ₂ e)
17/07/2017 - 31/12/2017	214282.9373	0.9678	207,383
01/01/2018 - 31/12/2018	694310.0902	0.9678	671,953
01/01/2019 - 31/12/2019	725745.5632	0.9678	702,377
01/01/2020 - 31/12/2020	715090.0597	0.9678	692,064

01/01/2021 - 31/03/2021	55230.1105	0.9678	53,452
Total	2404658.7609		2,327,228

5.2 Project Emissions

The project emission calculation as per para 35 of ACM0002 version 16,

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

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

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO₂/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO₂e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO₂e/yr)

$$PE_{FF,y} = 0$$

As per para 37 of ACM0002 version 16, “For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected”

$$PE_{GP,y} = 0$$

Not applicable for the hydro power projects

$$PE_{HP,y} = 0$$

Since, the project is run of river, the project activity does not involve the installation of a new reservoir; it does not result in CH₄ emission from the reservoir.

Therefore, $PE_y = 0$.

5.3 Leakage

As per para 60 of ACM0002 version 16, No leakage emissions need to be considered for the project activity.

5.4 Net GHG Emission Reductions and Removals

As per Para 61 of ACM0002 version 16; Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

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.)

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

$$ER_y = BE_y - PE_y$$

$$ER_y = 2,327,228 - 0$$

$$ER_y = 2,327,228 \text{ tCO}_2$$

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)
17-Jul-2017 – 31-Dec-2017	207,383	0	0	207,383
01-Jan-2018 – 31-Dec-2018	671,953	0	0	671,953
01-Jan-2019 – 31-Dec-2019	702,377	0	0	702,377
01-Jan-2020 – 31-Dec-2020	692,064	0	0	692,064
01-Jan-2021 – 31-Mar-2021	53,452	0	0	53,452
Total	2,327,228	0	0	2,327,228

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
2584901	2327228	-9.97%	There was complete shutdown of the plant for 3 months due to agitations in 2017-18.

APPENDIX I: BREAKDOWN DETAILS OF THE PROJECT

Year	Period		Details
	From	To	
2017-18	13-Jul-17	14-Sep-17	COMPLETE SHUTDOWN OF POWER STATION DUE TO GORKHA LAND AGITATORS MOB FORCED TO STOP THE POWER PLANT
2019-20	21-Mar-19	11-Jun-19	OUTAGE OF U#3 FOR INSPECTION/REPAIR OF THRUST BEARING PADS.

APPENDIX II: METER CALIBRATION DETAILS

The energy meters are in the custody of Power Grid Corporation of India Limited (PGCIL) and hence the calibration of the export meters is under the control of PGCIL. The Calibration frequency of the Energy Meters is once in 5 years. As the calibration of the Meters were done on 07/10/2013, this calibration certificate is valid till 06/10/2018.

The next calibration was done not as per schedule. As per the CDM validation and verification standard for project activities, Version 03.0, if the calibration is delayed, the following conservative approach need to be followed: “Applying the maximum permissible error of the energy meter to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error.”

The calibration of import energy meters is not under the control of PP. Since the calibration certificates are not available with PP, as a conservative approach, the maximum permissible error factor is applied to the import data as per the CDM guidelines.

As the % error indicated in the calibration reports is within the limits of Maximum Permissible Error (MPE) +/- 1% thus MPE of -1% has been applied to measured ERs i.e difference between baseline emission of energy export and baseline emission of energy import $((100\%-1\%)*(EG_{export,y} * BE_y - (100\%+1\%)EG_{import,y} * BE_y))$ has resulted in 2,314,581 tCO_{2e} GHG emission reductions or net anthropogenic GHG removals. Thus, the last calibration report and its reference data supports the requirement for the missing calibration report given in the VVS requirements.

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

Export Meter Details						
Feeder Details	220 KV NJP, Feeder-1		220 KV NJP, Feeder-2		220 KV TLDP-III, Feeder-3	
Meter Details	Main Meter	Check Meter	Main Meter	Check Meter	Main Meter	Check Meter
Meter Sl.No.	WBE12813	WBE12816	WBE12784	WBE12817	WBE12815	WBE12818
Meter Location	TLDP IV, Kalijhora, NHPC Limited	TLDP IV, Kalijhora, NHPC Limited	TLDP IV, Kalijhora, NHPC Limited	TLDP IV, Kalijhora, NHPC Limited	TLDP IV, Kalijhora, NHPC Limited	TLDP IV, Kalijhora, NHPC Limited
Accuracy Class	0.2s	0.2s	0.2s	0.2s	0.2s	0.2s
Make of Meter	Secure	Secure	Secure	Secure	Secure	Secure
Date of meter Test	07-10-2013	07-10-2013	07-10-2013	07-10-2013	07-10-2013	07-10-2013

Date of calibration	17-01-2022	24-03-2022	24-03-2022	17-01-2022	24-03-2022	17-01-2022
Due date of calibration	16-01-2027	23-03-2027	23-03-2027	16-01-2027	23-03-2027	16-01-2027

The details of the Import Meters are given below

Import Meter Details			
Meter Details	Main Meter	Main Meter	Main Meter
Old Meter Sl.No.	WEB18371	RSH5D104	WBE12815
New Meter Sl.No.	SL5E0065	Meter has not been changed	WLD02047
Meter Location	Vidyut Nagar	Power House	Kalijhora
Accuracy Class	0.5s	0.5s	0.5s
Make of Meter	Secure	Secure	Secure
Date of calibration	28-05-2020	31-03-2022	29-03-2022
Due date of calibration	27-05-2025	30-03-2027	28-03-2027

The meters for import energy in Vidyut Nagar and Kalijhora location have been changed. The reason for change in meters is to incorporate net meter. There was no erroneous monitoring observed and hence there is no effect on the baseline emissions. The meter changing letters have been submitted to the VVB.

APPENDIX III: CSR ACTIVITIES TAKEN UP BY PROJECT PROPONENT

The CSR activities taken up by NHPC Limited under Teesta Low Dam Project Stage IV (TLDP IV) are accessible through the following link. The CSR reports for every year are given in the below link:

Web-Link: <https://www.nhpcindia.com/welcome/page/155>