

TEESTA LOW DAM PROJECT, STAGE-IV



Document Prepared By EKI Energy Services Limited

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Prepared By	Ramkrishna Patil EKI Energy Services Limited
Contact	EKI Energy Services Limited Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78 Part II, Vijay Nagar, Indore – 452010, Madhya Pradesh, India. Email ID: ramkrishna.patil@enkingint.org Contact No. : +91 9096562065 Web site - https://enkingint.org/

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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 a Greenfield Hydro Power Project located on Teesta River near village Kalijhora, in Darjeeling district, of West Bengal state in India.

It is a run of the river scheme in the lower cascade of river Teesta. It has 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 equipped with four number Kaplan turbines each having a capacity of 40 MW and is utilized to generate 720 MU of electricity every year as per registered VCS PD.

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.

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 tCO₂e per year, thereon displacing 720,000 MWh/year amount of electricity from the grid as mentioned in registered VCS PD.

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 project has been implemented and the commissioning details are mentioned in section 1.5 of this MR.

The project is registered at VCS (Project I.D. 1423) and the details of the same can be viewed at http://www.vcsprojectdatabase.org/#/project_details/1423

The expected operational lifetime of the project is for 35 years. The total emission reductions achieved under this monitoring period is 805,717 tCO₂.

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

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources - Version 16.0

<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLLAR6MJ6VEU83>

The PP hereby confirms that, the project is an individual project and not a grouped project.

1.3 Project Proponent

Organization name	NHPC Limited
Contact person	Mr. Pradeep Johar
Title	Executive Director, R&D Division
Address	NHPC Limited, NHPC Office Complex, Sector 33, Faridabad 121003, Haryana, India
Telephone	+91-129-2271405
Email	-

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	VCS Consultant
Contact person	Mr. Manish Dabkara
Title	Director & CEO
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78 Part II, Vijay Nagar, Indore – 452010, Madhya Pradesh, India
Telephone	+91-9907534900
Email	manish@enkingint.org

1.5 Project Start Date

Project Start Date: The start date of the project activity is on 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-July-2016
	IV	40 MW	Kalijhora, Darjeeling (W.B)	11-Aug-2016

1.6 Project Crediting Period

Crediting Period Start date: The Project has commissioned on 14-Feb-2016.

- Estimated life time of the project: 35 years

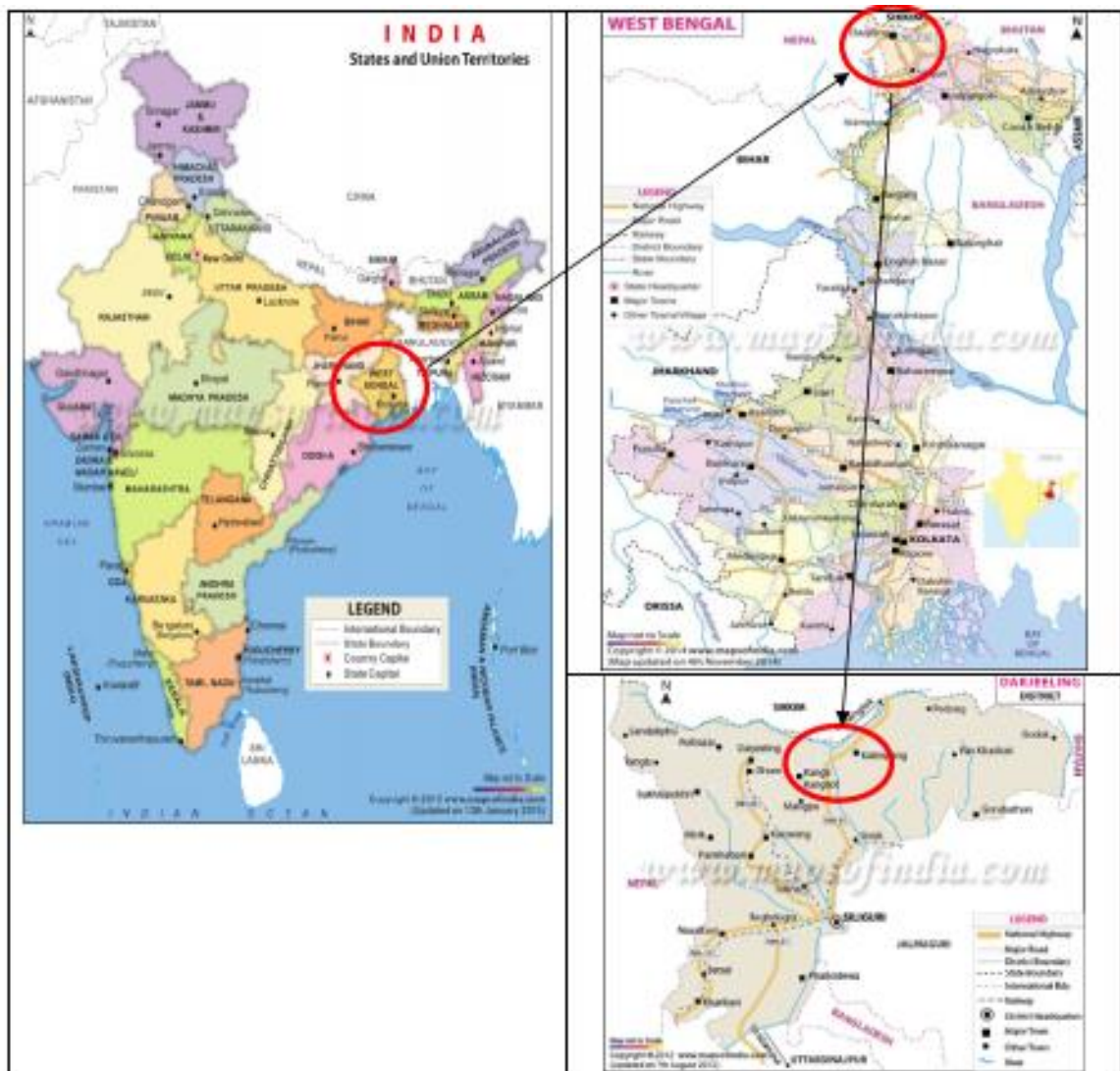
The project activity adopts renewable crediting period with the first crediting period of 10 years and with an option to renew twice, considering the lifetime of the project activity to be more than 35 years.

The start date of the first crediting period is 14/02/2016 and end date is 13/02/2026.

The current monitoring period is from 14/02/2016 to 16/07/2017. This is the first monitoring period of the project activity.

1.7 Project Location

The Teesta Low Dam Project, Stage-IV hydroelectric project is installed across Teesta near Kalijhora village in Darjeeling district in the state of West Bengal. The geographical co-ordinates are Latitude: 26.9273, Longitude= 88.4553. 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/EY2CL7RTEHRC9V6YQHAR6MJ6VEU83>

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 Other Programs

The project activity has not been registered with any other program.

1.10 Sustainable Development

Apart from generation of renewable electricity, the project activity contributes to the sustainable development of the region - socially, environmentally and economically. Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development.

1. Social well-being;
2. Economic well-being;
3. Environmental well-being; and
4. Technological well-being

Socio-economic well-being:

- Project activity has generated direct and indirect employment for skilled and unskilled manpower during construction phase as well as during operational stage and thus helped in controlling migration from the region and alleviation of poverty.
- The project activity's contribution of power supply towards the NEWNE grid is helping in the upliftment of the social life of the people by ensuring a sustainable and reliable source of power for the region.
- The Project activity has improved the infrastructural facilities like water availability, road, and medical facilities etc in the region.

Environmental well-being:

- The project activity generates clean and green power thus causing negligible emissions of greenhouse gases. By building and operating the Hydro power project, much pollution is avoided. In the absence of the project activity, equivalent power would have been generated based on the fossil fuels resulting in more Green House Gas emissions into the atmosphere.
- The project activity has reduced the dependence on fossil fuels for power generation thus conserving the natural reserves. The project has led to greenhouse gas emission reduction and hence contributed in mitigating climate change.

Technological well-being:

- The project activity has increased awareness and interest among the private players to make investments in similar areas. The technology employed in the project activity is safe and sound.

2 IMPLEMENTATION STATUS**2.1 Implementation Status of the Project Activity**

1. Starting date of the operation of the project activity 14/02/2016, which is the earliest date of commissioning of the unit I of the project activity.
2. The project activity consists of four units, each having 40 MW capacity totaling 160 MW capacities and supplying the entire electricity to the state grid. There has been no major downtime of equipments, overhaul times or exchange of equipments in the project activity during the current monitoring period.
3. During the current monitoring period there no events and/or situations have occurred that may impact the applicability of the applied methodology.

The Salient Features of Teesta Low Dam Project (Stage-IV) in West Bengal (4 x 40 = 160 MW) is given below.

1	LOCATION	
	State	West Bengal
	District	Darjeeling
	River	Teesta
	Dam Site	18.3 Km Downstream of Teesta Bridge on NH31A
	Power House	50 M 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 Sub-Mergence 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 Nos, 11 M (W) x 17 M (H)
6	DIVERSION CHANNEL	
	No. of Channels	
	Length	± 700 M
7	COFFER DAMS	
	Length	
	U/S Cofferdam	200 M
	D/S Cofferdam	200 M
	Height	
	U/S coffer dam	13 M
	D/S coffer dam	12.5 M
8	INTAKE	
	Invert Level	EL 165.50 M
	Number of Intakes	4 Nos
	Gate opening	7 M (W) x 7 M (H)
9	PENSTOCK	
	Number	Four
	Shape	Circular, Steel Lined
	Length	± 45 M each
	Diameter	7 M
10	POWER HOUSE	
	Type and Location	Surface; Left Bank
	Design and 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
11	TAIL RACE CHANNEL	
	Shape	Trapezoidal
	Bottom Width	100 M
	Length	98 M
	Weir Level	EL 152.12 M

12	SWITCHYARD	
	Size and Location	200 M x 95 M on Left Bank at EL ± 215.00 M

2.2 Deviations

2.2.1 Methodology Deviations

Not applicable.

2.2.2 Project Description Deviations

Deviation- 1:

In registered VCS PD, the source of data for export parameter is mentioned as Joint Meter Reading (JMR) / Monthly Special Energy Meter statement (SEM) from the energy meters. However, project activity does not have JMR or monthly energy meter statement. Hence, deviation is requested to use source as “Deviation Settlement Account document” for export parameter. Also there are no invoices raised for actual export value, thus actual export cannot be cross checked with invoices but can be compared with the Monthly Generation Report.

Justification –

Since hydro projects involves scheduling of energy and invoice is based on scheduled energy, however the difference between scheduled energy and actual energy is reflected in Deviation Settlement Account document. There is no JMR prepared for the project activity and no invoices are raised based on actual export values. Thus for proposed project activity, the deviation settlement account data has been considered for actual electricity supplied to grid parameter and also same data can be cross checked with Monthly Generation Report. The Deviation Settlement account document is accessible from <http://www.wbssldc.in/deviation-bill>.

The deviation Settlement account document considers actual export through online measurement of line-1 and line-2 meters. The PP is currently developing the third transmission line which will connect to project activity for measuring the electricity exported by the project to the grid. The third line is yet to be commissioned and hence, the line-3 meters are not under consideration during the current monitoring period.

The Monthly generation report gives the gross generation by the project activity and this monthly generation report value is higher than the export value mentioned in deviation Settlement account document, and the same can be checked from the ER sheet.

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 do 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 non-availability of earlier calibration of import meters are justified as below and conservative approach has been followed for import values for the current monitoring period.

1. The calibration of the import meters is not under the control of PP.
2. 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.
3. 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 do not have any role for calibration of the meters.
4. It is the state electricity board who decides about when to calibrate the import meters. The state electricity board does not share the calibration certificates with the PP for import meters and this is common practice followed by them.
5. 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 above deviations requested do not have any impact on applicability of the methodology, additionality or the appropriateness of the baseline scenario. Even with consideration of deviations, the project activity meets the applicability requirement of methodology. There is no any impact on the additionality due to deviation requested. The baseline scenario remain same even after deviation requested.

2.3 Grouped Project

Not applicable.

2.4 Safeguards**2.4.1 No Net Harm**

As per VCS Guidelines, this section is not mandatory being project is under verification and DOE Contract is prior to 19/04/2017.

2.4.2 Local Stakeholder Consultation

As per VCS Guidelines, this section is not mandatory being project is under verification and DOE Contract is prior to 19/04/2017.

3 DATA AND PARAMETERS**3.1 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)
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 2011-2012, 2012-2013 & 2013-2014. 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 the data	For the calculation of the Baseline Emission
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)
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 the data	For the calculation of the Baseline Emission
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)
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:

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

	$EF_{grid,BM,y}$ = Build margin CO ₂ emission factor in year y (tCO ₂ /MWh) $EF_{grid,OM,y}$ = Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 50% W_{BM} = Weighting of build margin emissions factor (%) = 50%
Purpose of the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period

3.2 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	832,524
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class
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

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 some 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 drawal (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 16 of methodology ACM0002. The deviation is requested for the source of data, and export parameter is measured through energy meters.

	statement published by Northern Regional Power Committee as mentioned in deviation (section 2.2 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	-

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 both 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 2.2 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	836,380
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	The Project activity has two 11kV Electricity Supply line from State

measurement methods and procedures to be applied	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 is 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	3,855
Monitoring equipment	Energy Meters of at least 0.5s 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.

3.3 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 equipments
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 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)³. 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.

³ CEA metering regulation clause 18 on page 12 of the regulation
http://www.powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

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 4.2. 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
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.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 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)

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

$$= 832,524 \times 0.9678$$

$$= 805,717 \text{ tCO}_2 \text{ (Rounded down)}$$

Period	Grid	Baseline emission factor (tCO ₂ /MWh)	Net Electricity generation (MWh)	Baseline emissions (ER _y)
14/02/2016 to 25/12/2016	NEWNE	0.9678	552,906.50	535,102
26/12/2016 to 16/07/2017	NEWNE	0.9678	279,617.91	270,615

Total			832,524⁴	805,717⁵
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4.2 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, $PE_y = 0$.

4.3 Leakage

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

4.4 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:

⁴ This is the Round Down value

⁵ This is the Round Down value

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:

$$ER_y = BE_y - PE_y$$

$$ER_y = 805,717 - 0 = 805,717 \text{ tCO}_2$$

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)
2016	535,102	0	0	535,102
2017	270,615	0	0	270,615
Total	805,717 ⁶	0	0	805,717

APPENDIX 1: METER DETAILS

The details of the Export Meters are given below.

Export Meter Details						
Feeder Details	220 KV NJP, Feeder- 1		220 KV NJP, Feeder- 2		220 KV TLDP-III, Feeder- 3 ⁷	
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 Calibration ⁸	07-10-2013	07-10-2013	07-10-2013	07-10-2013	07-10-2013	07-10-2013

⁶ This is the Round Down value

⁷ The feeder 3 is under commissioning stage for power export and this deviation is not applicable for current monitoring period.

⁸ The Calibration frequency of the Energy Meters is once in 5 year. As the calibration of the Meters were done on 07/10/2013, this calibration certificate is valid during the current monitoring period (i.e. from 14/02/2016 to 16/07/2017). The calibration certificate is valid till 06/10/2018.

Due Date of Calibration⁹	06-10-2018	06-10-2018	06-10-2018	06-10-2018	06-10-2018	06-10-2018
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The details of the Import Meters are given below.

Import Meter Details¹⁰			
Meter Details	Main Meter	Main Meter	Main Meter
Meter Sl. No	WEB18371	RSH5D104	WBE12815
Meter Location	Vidyut Nagar	Power House	Kalijhora
Accuracy Class	0.5s	0.5s	0.5s
Make of Meter	Secure	Secure	Secure

⁹ Calibration Frequency for the Energy Meters is once in 5 year.

¹⁰ Since the calibration of the Import Meters are not in the hands of PP, deviation has been taken in section 2.2 of this report.