

URI II HYDROELECTRIC PROJECT



Document Prepared By EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Uri II Hydroelectric Project is Greenfield Hydro Power Project located on river Jhelum near village Uri, district Baramullah of J&K state of India. It is a run of the river scheme with a concrete gravity dam, an underground power house and 8.95 km long water conductor system. A maximum gross head of 130 m is proposed to be utilised to generate 1083.31 MU with installation of 4 Turbines of 60 MW each.

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.

The project activity commissioning details are as below

Unit Number	Commissioning Date
Unit 1	25-Sep-13
Unit 2	16-Nov-13
Unit 3	27-Sep-13
Unit 4	2-Feb-14

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) by displacing equivalent amount of electricity from the grid as per 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 was registered at VCS (Project I.D. 1424) and the details of the same can be viewed on http://www.vcsprojectdatabase.org/#/project_details/1424

The expected operational lifetime of the project is for 35 years. The total emission reductions achieved under this monitoring period is 1,305,089 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/EY2CL7RTEHRC9V6YQHAR6MJ6VEU83>

Further the project activity is not among the grouped projects, which allows the expansion of project activity subsequent to project validation. Initial project activity instances identified in the project description will remain same throughout VCS verification cycle.

1.3 Project Proponent

Organization name	NHPC Limited
Contact person	Mr. R. K. Gupta
Title	Executive Director, R&D Division
Address	NHPC Limited, NHPC Office Complex, Sector 33, Faridabad - 121003, Haryana, India
Telephone	-
Email	-

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Ramkrishna Patil
Title	GM-Operations
Address	Office No. 201, EnKing Embassy Plot No. 48, Scheme No. 78 Part II, Vijay Nagar INDORE – 452001
Telephone	+91-731-4289086
Email	ramkrishna.patil@enkingint.org

1.5 Project Start Date

Project Start Date: 25-Sep-2013 (Earliest Date of commissioning);

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
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Uri II Hydroelectric Project	I	60 MW	Uri, Baramullah, J&K	25-Sep-13
	II	60 MW	Uri, Baramullah, J&K	16-Nov-13
	III	60 MW	Uri, Baramullah, J&K	27-Sep-13
	IV	60 MW	Uri, Baramullah, J&K	2-Feb-14

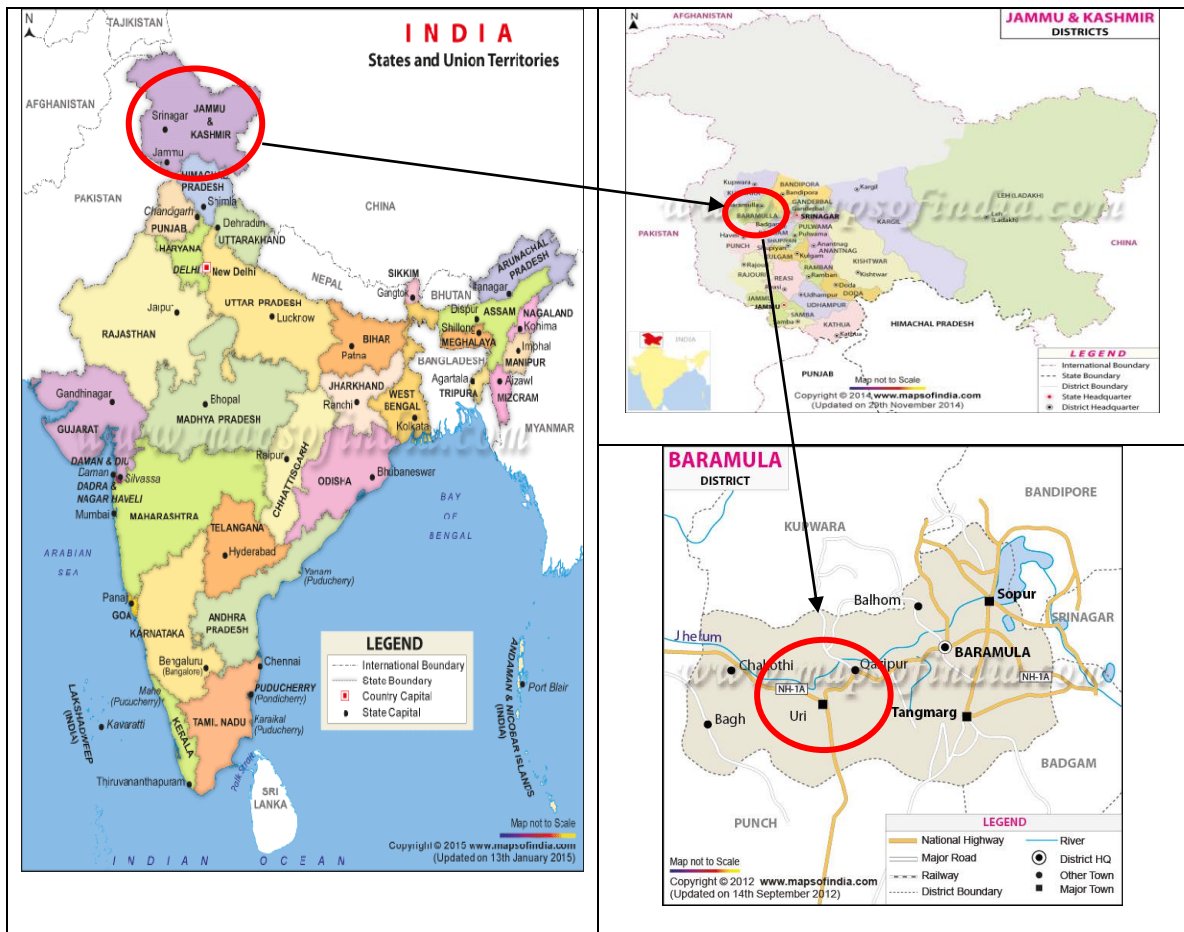
1.6 Project Crediting Period

The project crediting period shall be a maximum of ten years which will be renewed at most twice.

The start date of first crediting period is 25/09/2013 and end date as 24/09/2023.

1.7 Project Location

The Uri-II hydroelectric project is installed across Jhelum River near Uri village in Uri Tehsil of Baramulla district of Jammu and Kashmir. The geographical co-ordinates of the project activity are ranges from latitude : 34° 5' 34" N to 34° 6' 27" N and Longitude: 74° 1' 52" E to 73° 56' 23"E. The map below shows the location of the project activity:



1.8 Title and Reference of Methodology

Project Type: I – Renewable Energy Projects

Methodology:

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

<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

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 contribute 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

Social well-being

The project activity results in creating job opportunities for the local population on temporary and permanent basis. Manpower is required both during erection and operation of the renewable energy projects. This would result in the improvement in living standards of the local community.

The installation of the renewable energy projects also led to development of basic infrastructure like roads, communication with the nearby cities etc. which also improved in living standards of the local population.

Economic well-being

The project activity creates direct and indirect job opportunities to the local community during installation and operation of the renewable energy projects.

The investment for the project activity instances under grouped project activity would lead to the improvement in the economic activity in the local area.

Environmental well-being

The project activity utilizes renewable energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As renewable energy projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment.

Technological well-being:

Clean technology transfer in renewable energy generation and optimal use of renewable energy in the industry.

There is no any provision is required to monitor and report these sustainable development indicators as per national rules and regulations.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

1. Starting date of the operation of the project activity 25/09/2013, which is the earliest date of commissioning of the unit I of the project activity and 02/02/2014 which is date of the commissioning of the last unit IV of the project activity bundle.
2. The project activity consists of four units each having 60 MW capacity totaling 240 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.

2.2 Deviations

2.2.1 Methodology Deviations

Not applicable

2.2.2 Project Description Deviations

Deviation 1 –

- a) In registered VCS PD, the export parameter mentioned source 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 compare with Monthly Generation Report.

- b) Since the calibration frequency is not followed as per registered VCS PD, and PP have delayed calibration certificates, thus error factor of accuracy class is applied to export values as a conservative approach and deviation is requested for the not following calibration frequency as per registered VCS PD.

Justification –

- a) 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 any 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 considers actual export through online measurement of line 1 and line 2 meters. The Monthly generation report gives the gross generation by the project activity and this monthly generation report value should be higher than export value mentioned in deviation Settlement account document. The change is sources for the export parameter and it's cross check mechanism is mentioned as deviation in VCS MR.
- b) As per CDM guideline, if the delayed calibration result is within permissible limit of accuracy class, then error factor of accuracy class need to use conservatively to conclude the verification. PP have not initial calibration certificates, however delayed calibration result is within permissible limit of accuracy class. Hence PP has applied accuracy class of meter as error factor for the export of project activity conservatively. The deviation is requested for not following calibration frequency due to non-availability of initial calibration certificates and application of error factor to export values.

Deviation 2 –

The below deviation is requested for the project activity

- a) For the proposed project activity, for auxiliary purpose and emergency purpose, the electricity is consumed from DG sets and there is no any import from grid for the operation of project activity as mentioned in registered VCS PD. However these regional supply lines are used for colony purpose only. Though this colony is not part of project boundary, PP has considered the electricity import of colonies as a conservative purpose. Since calibration certificates for import meters are not available with PP, error factor is applied as a conservative approach.
- b) In registered VCS PD, the source of data for import parameter is mentioned as Monthly electricity sales bills raised by State Electricity Board, however PP do not have these bills, thus PP has submitted colony meter import data certified by state electricity board. Thus deviation is requested for the source of import data.

Justification –

- a) The project activity auxiliary/emergency purpose electricity is fulfilled from DG sets and there is no any grid import for the project activity. The grid import used for colony purpose are

considered for ER calculations as a conservative approach. As per methodology and registered VCS PD, the fossil fuel consumption due to DG set is not required to be considered. Thus consideration of import of electricity for colony purpose is conservative.

- b) The state electricity board takes monthly reading of colony import meters and same is considered conservatively as import of project activity as mentioned in above point.. Due to non-availability of all sales bills, PP has taken certification from state electricity board for the import data and same can be considered as authentic data for the import parameter.

Deviation 3 –

The typo error for unit 2 commissioning date is corrected as 16/11/2013. The supporting document is submitted to DOE.

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
Value applied	0.9862 (NEWNE Grid)
Justification of choice of data or description of measurement methods	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

and procedures applied	Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India
Purpose of the data	To calculate baseline emission reduction
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 years 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	To calculate baseline emission reduction
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: $EF_{grid,BM,y}$ = 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 the data	To calculate baseline emission reduction
Comments	This parameter is fixed ex-ante for the entire crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
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Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	It is a calculated based on EGExport,y , EGImport,y
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	Monthly recording.
Value monitored	1,348,511
Monitoring equipment	Not Applicable as it is a calculated value
QA/QC procedures to be applied	Net electricity supplied to grid is a calculated value. Therefore QA/QC is provided for individual parameters EGExport,y , EGImport,y: • EGExport,y is sourced from the deviation settlement account statement published by Northern Regional Power Committee as mentioned in deviation (section 2.2 of MR) • EGImport,y is of colony meters and sourced from the certified data 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 (section 2.2 of MR). • Please refer deviations mentioned in section 2.2.2 of this MR.
Purpose of the data	To calculate baseline emission reduction
Calculation method	$EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$
Comments	-

Data / Parameter	EGExport,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 issued by Northern Regional Power Committee as mentioned in deviation (section 2.2 of MR)
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) installed at the power station, for each generating units. These are connected via two transmission lines of 400 kV, each having its own SEM meter (main meter and check meter). In case, any one transmission line is not in service than complete load is shifted to other transmission line which is in operation. 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. Northern Regional Power Committee monitors the export of project activity through online on daily basis and publishes weekly Deviation Settlement Account where actual export value is mentioned. The check meter shall be 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 shall be used for accounting and billing purpose. Records of Deviation Settlement account is used for the calculation of Electricity exported by the project to the grid at project site switch yard. The deviation Settlement account statement mentioned collectively total export of all units and of both transmission lines.
Frequency of monitoring/recording	Continuous measurement and monthly recording
Value monitored	1,350,280
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class
QA/QC procedures to be applied	Energy meters will be calibrated once in a five year and faulty meters will be duly replaced immediately. 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 should be higher than export value mentioned in deviation Settlement account document. The change is sources for the export parameter and it's cross check mechanism is mentioned as deviation in VCS MR.
Purpose of the data	To calculate baseline emission reduction
Calculation method	The deviation Settlement account statement mentioned collectively total export of all units and all transmission lines.

Comments	The data would be archived electronically and maintained for the entire crediting period plus two years. As mentioned in deviation, the main source for this export parameter is deviation Settlement accounts.
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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	Data certified by state electricity board
Description of measurement methods and procedures to be applied	The Project activity has provision for DG sets which is used to import electricity during start-up, shutdown and the lean period. As per methodology, there is no any project emissions applicable due to DG set. However electricity import by colonies are considered as conservative approach as described in deviation. The data will be recorded by duly tested and sealed meter installed by State Electricity Board. The meter will be calibrated and maintained by State Electricity Board. As mentioned in deviation, there is no any grid electricity import for project activity and these regional supply lines are used for electricity import by colonies. As a conservative, PP has considered these import values and also error factor is applied due to non-availability of import meters calibration reports.
Frequency of monitoring/recording	Continuous measurement and monthly recording.
Value monitored	1,768
Monitoring equipment	Energy Meters of 0.5s accuracy class
QA/QC procedures to be applied	Energy meters will be calibrated once in a five year and faulty meters will be duly replaced immediately. The meter will be calibrated and maintained by State Electricity Board. EG_{Import,y} is sourced from the document certified by state electricity board.
Purpose of the data	To calculate baseline emission reduction
Calculation method	EG _{Import,y} is sourced from the document certified by state electricity board
Comments	The data would be 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 shall maintain complete and accurate records and all other data required for the purpose of proper administration and operation of the hydro power plant. The data will be 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 calibrations of 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 Monthly Joint Meter Reading (JMR) / Monthly Special Energy Meter statement (SEM) and EG_{import} is sourced from Monthly electricity sales bills raised by State Electricity Board
4. Meter Details:
 - Details of MAIN & CHECK METER for LINE-1

MAIN METER for LINE-1		CHECK METER for LINE-1	
Meter Serial No.	NP-7035-A	Meter Serial No.	NP-7074-A
Model	ER300P	Model	ER300P
Make	L&T	Make	L&T
Accuracy Class	0.2S	Accuracy Class	0.2S

- Details of MAIN & CHECK METER for LINE-2

MAIN METER for LINE-2		CHECK METER for LINE-2	
Meter Serial No.	NP-7067-A	Meter Serial No.	NP-7007-A
Model	ER300P	Model	ER300P
Make	L&T	Make	L&T
Accuracy Class	0.2S	Accuracy Class	0.2S

All above meters calibration done on 05/05/2016 is available with PP and calibration certificates at the time of commissioning was not available, thus delay in calibration is considered and error factor is applied for complete current monitoring period.

For the proposed project activity, for auxiliary purpose and emergency purpose, the electricity is consumed from DG sets and there is no any import from grid for the operation of project activity. However these regional supply lines are used for colony purpose. Though this colony is not part of project boundary, PP has considered the electricity import of colonies as a conservative purpose. The import meters are not under control of PP, thus calibration details for Import meters are not available with PP. As a conservative approach, PP has applied error factor Of 0.5% for the import values to arrive conservative emission reductions. No use of grid electricity import for the project activity and further consideration of colony grid import with application error factor as a conservative approach is considered as deviation for the project activity.

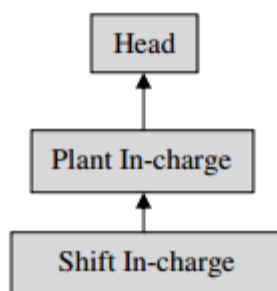
5. Monitoring times and periods - The data will be monitored on a continuous basis but will be recorded on a monthly basis with the energy meters installed at the site.
6. Data Accuracy - As per clause 4.0, Metering Arrangement of the Power Purchase Agreement (PPA) the metering arrangement including its installation, testing, maintenance and collection transportation and processing of data required for energy exchange 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). Thus, the meters recording the electricity exported will be calibrated at least once 5 years.

7. 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 registered VCS PD document.
8. Monitoring roles and responsibilities: A project team would be constituted for the monitoring of the project. This team will be responsible for data collection and archiving. The team will meet periodically to review the data collected as per monitoring plan. In case of any irregularity observed by any of the team members, it will be informed to the concerned person for necessary actions to be taken. The following be will 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
 - c. Shift In-charge: Responsibility of daily report generation from the SCADA system/ log-books

The line diagram for GHG data collection and management system is as below

Organisational Structure for Monitoring



9. 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.

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

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

Period	Grid	Baseline emission factor (tCO ₂ /MWh)	Net Electricity generation (MWh)	Baseline emissions (ER _y)
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	NEWNE	0.9678	1,348,511	1,305,089
Total				1,305,089

Round down values is 1,305,089tCO₂

The actual emission reductions are 23.13% higher than estimated emission reductions for same period. This is due to high PLF of project activity due to more water availability. This is not under control of PP and not the change in project design. As per registered VCS PD, the threshold limit for PLF is 24.02%, thus with actual high PLF of 23.13%, there is no any adverse impact on additionality

4.2 Project Emissions

As per registered VCS PD, there are no any project emissions occurred for the project activity

Period	Project Emissions (PE _y)
25/09/2013 to 28/09/2014	0

4.3 Leakage

As per registered VCS PD, there are no any leakage emissions occurred for the project activity.

Period	Project Leakage (LE _y)
25/09/2013 to 28/09/2014	0

4.4 Net GHG Emission Reductions and Removals

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)
25/09/2013 to 28/09/2014	1,305,089	0	0	1,305,089
Total	1,305,089	0	0	1,305,089

Vintage wise VCUs

From 25/09/2013 to 29/12/2013 – 153,468 tCO₂e

From 30/12/2013 to 28/09/2014– 1,151,621 tCO₂e

APPENDIX 1: NA

Not Applicable