

VALIDATION REPORT



Document Prepared By Earthood Services Private Limited

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Version	2
Report ID	VCS.VAL.VER.14.22

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Summary:

Earthood Ref. No.	VCS.VAL.VER.14.22	
Title of project activity	Uri II Hydroelectric Project	
Host Party	India	
Other Party	No	
Scale of project	Large	
Sectoral scope(s)	1	
Applied methodology/ies	ACM0002 version 16.0	
Crediting period (CP)	25/09/2013 TO 24/09/2023	
Type of crediting period	Renewable	
Length of crediting period	10 years	
B) PDD	Version	Date
Initial	1	11/02/2015
Final	5	31/10/2015
C) Validation Report	Version	Date
Draft	0	02/07/2015
Final	2	28/12/2015
D) Validation Team		
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Technical Expert (TA 1.2)	Shreya Garg	
Finicial Expert	Abhishek Mahawar	
F) Technical Review / Approval		
Technical Reviewer	Ravikant Soni	
Technical Expert (TA 1.2)	Ravikant Soni	
G) Final opinion		
Earthood Services Private Limited (Earthood) has performed a validation of the project activity “Uri II Hydroelectric Project” in India. The validation was performed on the basis of rules and requirements defined by VCS for the project activities. The reviews of the PDD, supporting documentation and subsequent follow-up actions (onsite visit and interviews) have provided Earthood with sufficient evidence to determine the fulfilment of stated criteria. The project correctly applies the approved baseline and monitoring methodology ACM0002 Version 16.0. The project activity is a hydroelectricity project in the state of Jammu & Kashmir, India. By avoiding the baseline emissions that would occur in the absence of project activity mainly through the use of fossil fuel intensive electricity, the project results in reductions of CO₂e emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario and the emission reductions attributable to the project are, hence, additional to any that would occur in the absence of the proposed VCS project activity. The emission reductions from the project activity are estimated to be 1,048,427 tCO₂e per year		

(annual average) and 10, 484,270 tCO₂e over the entire selected 10 years crediting period renewable. The emission reduction forecast has been checked, and it is deemed likely that the stated amount is achievable given that the underlying assumptions do not change.

The monitoring plan adequately provides for the ex post monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is Earthood's opinion that the NHPC shall be able to implement the monitoring plan.

In summary, it is Earthood's opinion that the project activity "Uri II Hydroelectric Project" in India, as described in the final PD, meets all relevant VCS requirements and correctly applies the baseline and monitoring methodology ACM0002 Version 16.0. Therefore, Earthood requests the registration of the project as a VCS project activity.

H) Authorization

Managing Director	Kaviraj Singh
Date	28/12/2015

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1 INTRODUCTION

1.1 Objective

The purpose of validation is a thorough and independent assessment of proposed project activities against the applicable VCS requirements by DOE. The validation process shall determine whether the proposed project activity complies with the requirements of paragraph 37 of the CDM M&Ps (with the exception of paragraph 37 (c) for CCS project activities), the applicability conditions of the selected methodology, and, where applicable, the selected standardized baseline, and guidance issued by the Board.

1.2 Scope and Criteria

The scope of validation is to assess the claims and assumptions made in the project design document (PD) against the VCS criteria, including but not limited to, CDM PS, CDM VVS, applied methodology and other relevant rules and requirements established for VCS project activities.

1.3 Level of Assurance

A draft validation report that is prepared by assessment team will be reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable VCS and CDM (Clean Development Mechanism) requirements as appropriate. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the validation team. The report approved by Quality Manager is endorsed by Managing Director, who is overall responsible to ensure quality, before final release. The further details of applicable procedures and responsibilities about Earthood Quality Management System (QMS) are available on its website (www.earthood.in).

The validation result has a reasonable level of assurance in validation that GHG assertions are free of material errors, omissions and misrepresentations. The document reviewed are included under Appendix 1 of this report.

1.4 Summary Description of the Project

The project “Uri II Hydroelectric Project” is Greenfield Hydro Power Project located on river Jhelum near village Uri, district Baramullah of J&K state of India. The project intends to reduce emission by generating power using hydel energy and replacing fossil fuel intensive electricity. It is a run of the river project with a concrete gravity dam and an underground power house consisting of 4 turbines of 60 MW each.

The electricity generated is evacuated to the national grid through regional grid and the project is set up to generate 1083.31 MU annually resulting in 1,048,427 tCO₂e per year.

2 VALIDATION PROCESS

2.1 Method and Criteria

Earthood followed a rule based validation approach, wherein, the contract review is undertaken as per valid/effective version of CDM Accreditation Standard. Once the contract is agreed for validation, the PD of the project activity is made available to the DOE as per VCS procedures. Key steps are described in following sections of this report.

2.2 Document Review

The validation is performed primarily as a document review of the available PD version 1 dated 11/02/2015, subsequent versions including the final PD version 5 dated /2015. The assessment is performed by a validation team using a standardized validation protocol. The cross checks were performed between information provided in the PD and their quoted sources including but not limited to the ones provided by PP. The validation team's sectoral or local expertise and, if necessary, independent background investigations are considered in the report, wherever applicable.

2.3 Interviews

The assessment team conducted an onsite assessment on 27/03/2015 and 28/03/2015 and following persons were interviewed.

S. No.	Name	Organization
1	Rajeev R. Asthana	NHPC
2	Jaspreet Singh	NHPC
3	N.S. Parameshwaran	NHPC
4	Anish Gourah	NHPC
5	P.K. Pareda	NHPC
6	Deepak Jain	EKI ESL

Deepak Jain was interviewed (telephonically and/or in person) on more number of occasions than indicated above.

2.4 Site Inspections

The assessment involved a desk review of relevant documentation as well as an on-site visit(s). The personnel employed and their role in this assessment is mentioned below;

Role	Name	Nature of involvement					
		Desk Review	On Site Visit	Reporting	Supervision	Technical Review	TA Expert
Team Leader	Shreya Garg	Y	Y	Y	Y		
Technical Expert (TA 1.2)	Shreya Garg	Y	Y	Y	Y		Y
Technical Reviewer	Ravi Kant Soni					Y	Y
Technical Expert (TA 1.2)	Ravi Kant Soni					Y	Y
Financial Expert	Abhishek Mahawar	Y		Y	Y		
Trainee validator	Anshika Gupta	Y		Y			

The site visit was conducted by validation team from 27/03/2015 to 28/03/2015 at Uri District Baramulla, Jammu & Kashmir. The CVs of validation team members and technical reviewer is included under appendix 3.

2.5 Resolution of Findings

The validation protocol used for the assessment is designed in accordance with the latest/valid version of Validation and Verification Standard (as referenced under Appendix 1). The validation

protocol is an internal document prepared in Excel spreadsheet that is available on request, if required. It serves the following purposes:

- Reference to available information relating to projects or technologies similar to the proposed project activity under validation;
- Review, based on the approved methodology being applied, of the appropriateness of formulae and accuracy of calculations.
- Organises, details and clarifies the requirements the project is expected to meet; and
- Documents both how a particular requirement has been validated and the result of the validation (reporting).

As an outcome of the validation process, the validation team can raise different types of findings, which may be of following types:

CL: Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

CAR: Where a non-conformance arises, the validator shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The CDM/VCS requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.

Corrective Action Requests and Clarification Requests are raised in the draft validation protocol and detailed in a separate finding document. In this document, the project participant is given the opportunity to “resolve and respond” the outstanding CARs and “respond” to CLs in one or several attempts. The response and revised documentation along with supporting evidences/references provided by PP, as appropriate, is assessed by the validation team to determine whether the stated requirements is met and suitably recorded. All the findings raised, response and/or resolution provided by PP and their assessment is included as Appendix 2 of this report in a clear and transparent manner.

FAR: Forward Action Request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs does not relate to the CDM requirements for registration.

3 VALIDATION FINDINGS

3.1 Project Details

The project activity is a run-of river hydro power project on river Jhelum in Jammu & Kashmir. The project being a run-of river project does not have any seasonal storage; storage is limited to only diurnal storage during lean season. The project involves the installation of 4 vertical Francis

turbines of the capacity 60 MW each, totalling to 240 MW. The technical specifications of the turbine and generator as verified from the DPR/7/ are as follows:

Turbine Specification	
Type of turbine	Vertical Francis
Net head	118 m
Design discharge	56.25 m ³ /sec
Generator specifications	
Make	ALSTOM
Type	Semi umbrella
Voltage	11 kV
Frequency	50 Hz
Nominal Speed	300 rpm
Number of generating units	4
Rated output	60 MW (67 MVA)
Generator efficiency (not less than)	98%
Turbine efficiency (not less than)	94%
Generator - Voltage evacuated	11 kV
GIS - Voltage evacuated	400 kV

The proposed project activity has been planned for annual energy generation of 1083.31 MUs considering 90% dependable year with 95% machine availability at PLF of 51.53%; information verified from the DPR/7/. The electricity generated by the project activity would be exported to the Northern, Eastern, Western and North Eastern (NEWNE) grid through the Regional Load Despatch Centre (RLDC).

The project falls into sectoral scope 1, which is consistently indicated in the VCS PD/2/ and is appropriate. The project category and type is correctly mentioned in the VCS PD. Also, it has been verified and accepted that it is not a grouped project.

The project entity (NHPC Limited) is correctly listed in the VCS PD and EKI Energy Services Limited has been listed as the other entity the same information was verified from the communication agreement/30/ submitted to the audit team.

The project start date considered and verified is 25 September 2013 which is the date for the commissioning/10,12/ of the first turbine verified from the fitness certificate. The information on the project start date was also cross verified from public sources available online/36/. The assessment team, during the physical site visit, has also cross verified the information through the name plates of the main equipment. The start date was found in accordance with the latest VCS standard which states *"The project start date is the date on which the project began generating GHG emission reductions or removals"*. It was concluded that the earliest date when the project shall started generating emission reductions is considered as project start date and accepted as the start date by the assessment team.

The project crediting period is correctly filled in the VCS PD, which is selected as renewable type for a period of 10 years from the start date.

The project is a Large Scale project and estimates to reduce 1,048,427 tCO₂e every year, the value is consistent throughout the project documentation.

The exact geographical location of the project activity has been provided as follows: Latitude: 34° 8' 39.0474" N Longitude: 74° 11' 8.6634" E. these geographical coordinates were verified by the assessment team during the site visit and from DPR/7/.

Latitude: 34° 8' 39.0474" N Longitude: 74° 11' 8.6634" E

The project activity is setup to produce clean electricity which in turn would replace electricity from carbon intensive electricity. The project activity is expected to reduce 1,048,427 tCO₂e annually and has a renewable crediting period; first crediting period of 10 years.

The VCS PD includes sufficient information with regards to project activity, system and equipment installation and average lifetime of the equipment. A life of 35 years has been considered for the project power plant which is acceptable, in the opinion of the technical expert.

The project has been set after it has sought all applicable permissions and clearances from local, state and central authorities. All clearances like CEA Clearance/29/, environmental clearance, forest clearance/20/ and approval from pollution control board /10/ submitted to the assessment team were reviewed and found to be in order. It was concluded that project was found to be in compliance to all applicable laws and regulation for hydro power plants in India.

The detailed project report was reviewed and the information provided therein was also cross verified from the available public source of NHPC/07/ and found to be acceptable especially with regard to ownership of the project or right to use. The PPs declaration was obtained to confirm that the project is not listed in any other emission reduction trading program or any other binding limits. The project was also not rejected by any GHG program. The assessment team has also cross verified information from various public sources and no contradictory evidence was found.

The project is not a grouped project and therefore no further assessment towards group project is required to be addressed.

The VCS PD does not indicate anything to be commercially sensitive and there is no further information included in the VCS PD.

This is to confirm that the description in the project description is accurate, complete and provides a robust understanding of the nature of the project activity.

3.2 Application of Methodology

3.2.1 Title and Reference

The proposed CDM project activity applies approved methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" Version 16.0. The applicable tool prescribed by the methodology and applied by the project activity is "Tool to calculate the emission factor for an electricity system" version 04.

The PD, V01, was completed using applied approved methodology ACM0002, V16.0. The validation team has performed the assessment based on above applied version of methodology to complete the Annex-I (Protocol), the assessment of later versions of the PD are performed as per recent version (ACM0002, V16.0.0) of methodology available.

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

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

3.2.2 **Applicability**

The proposed project activity is a Greenfield grid connected hydroelectric power project, and the installed rated capacity of the project is 240 MW. The assessment team has verified the technical parameters from the DPR/7/. The applicability condition of the approved methodology ACM0002, V16.0.0/6/ and the "Tool to calculate the emission factor for an electricity system/21/ referred to in the approved methodology, in context of project activity is demonstrated in PD/1/.

Table: The summary of the project's compliance with applicability criteria of methodology.

Applicability conditions in V16.0.0 of ACM0002	Means of Validation
This methodology is applicable to grid-connected renewable energy power generation project activities that: - Install a Greenfield power plant; - Involve a capacity addition to (an) existing plant(s); - Involve a retrofit of (an) existing operating plants/units; - Involve a rehabilitation of (an) existing plant(s)/unit(s);or - Involve a replacement of (an) existing plant(s)/unit(s).	The project activity is new renewable energy generation from hydro energy which is renewable energy and supplies electricity to the grid. The clarification provided in the PDD/1/ was found consistent with the supporting documents and onsite observations. This is verified through the DPR/7/ and power purchase agreement(PPA)/13/
The methodology is applicable under the following conditions: - The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; - In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference	The project activity is a run-of river project; the assessment team has verified the information from DPR/7/, the same has been further confirmed during site visit and found acceptable.

period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	
3. In case of hydro power plants, one of the following conditions shall apply: a. The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or b. The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m²; or c. The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or d. The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: i. The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; ii. Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; iii. Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the	The project activity is a run-of-the-river project with little pondage, the power density of each reservoir, as per the definitions given in the Project Emissions section, is greater than 4 W/m² after implementation of the project activity. The information has been verified from the DPR/7/.

total installed capacity of integrated hydro power project	
In the case of integrated hydro power projects, project proponent shall: - Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or - Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project activity is a run of the river project as verified during the site visit. The information has also been verified from the DPR/7/.
The methodology is not applicable to: - Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; - Biomass fired power plants/units.	The proposed activity is a hydro power project/1,7/ thus this parameter is not applicable to the project activity.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity	The proposed activity is a greenfield activity/1,7/ thus this parameter is not applicable to the project activity.

and undertaking business as usual maintenance”.	
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The assessment team has assessed the applicability requirements and cross-verified with the supporting information and interviewed the PP, in consultation with local expertise and sector expert, and found the applicability conditions of the methodology ACM0002 V16.0.0 to the project activity are reasonable and acceptable.

3.2.3 Project Boundary

The project boundary includes the project power plant and all the power plants connected physically to the electricity system that the project power plant is connected to. The project boundary has been validated through site visit at the project site confirming the project features. This was further cross checked and confirmed with DPR/7/.

Table: The system boundary is justified transparently and is presented below.

	GHGs involved	Description
Baseline emissions	CO ₂	Major emission source, which is emitted from the electricity generation by fossil fuel-fired power plants connected to NEWNE. The baseline emission factor is calculated as per applied tool to calculate emission factor of an electricity system/21/.
Project emissions	CH ₄	The emissions have not been accounted as the power density is greater than 10 W/m ² , which is in accordance with ACM0002/5/.
	CO ₂	Minor emission source therefore excluded, in accordance with methodology ACM0002/5/.
Leakage	N/A	The project being a renewable resource based power project required to consider the leakage as per ACM0002, if energy generating equipment is transferred from other project. The project activity does not involve the transfer of equipment, hence leakage is considered as “zero”, which is appropriate.

3.2.4 Baseline Scenario

As per ACM0002 version 16/5/, “If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

- 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, as reflected in the combined margin (CM) calculations described in the ‘Tool to calculate the emission factor for an electricity system’

The project activity will generate electricity from hydro energy supplying electricity to the NEWNE Grid of India/1/. In the absence of the project activity the same amount of electricity would have been produced from the fossil fuel intensive grid electricity. The implementation of the project activity therefore displaces the equivalent quantum of power from the state grid. Thus, the baseline selected for the project activity is the generation of electricity at current levels of emissions from the NEWNE grid of India. The baseline emissions have been calculated in

accordance with procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'/21/.

3.2.5 **Additionality**

The project is a large scale project. In accordance with applied methodology ACM0002, the additionality is demonstrated based on the valid version of the "Tool for demonstration and assessment of additionality (Ver. 07) /22/. The approach has been assessed to be appropriate for the assessment of additionality for this project activity.

The project developer had chosen investment analysis and to demonstrate the investment analysis selected project IRR as financial indicator. Since baseline is outside the direct control of the project developer (grid connected power) and hence, the choice of the project developer is restricted to 'invest or not to invest', therefore the benchmark approach is most suited as per Guidance 19 of Annex 05 of EB 62/28/.

In the above background validation team concludes that the additionality justification given by the project developer is in accordance with the requirements derived from the approved CDM methodology and the methodological tools referred therein.

Identification of alternatives

This project activity is based on the approved methodology ACM0002 Ver. 16.0.0/5/. As per the methodology "If the project activity is the installation of a new grid-connected renewable power plant/unit (which the project is), the baseline scenario is the following:

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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

PD/1/ lists down alternatives to the project activity in order to determine the most realistic baseline scenario. The alternatives are as follows:

Alternative 1: *The proposed project activity not undertaken as a VCS project activity.*

Alternative 2: *No proposed project activity and equivalent amount of energy would have been produced by the grid electricity system through its currently running power plants and by new capacity addition to the grid i.e. Continuation of the present situation.*

Since the approved methodology ACM0002 version 16 used by the project activity prescribes the baseline scenario, no further analysis of alternatives is required for the project activity

3.2.6 **Investment analysis**

PD demonstrates that the project will not be financially feasible, without the revenue from the sale of voluntary emission reductions (VERs). The claim of the project developer that the project scenario is not economically feasible without benefits from VER sales has been assessed by the Validation Team through the following steps:

a) Appropriateness of investment analysis, financial indicator and benchmark:

Project developer has demonstrated that the financial returns of the proposed VCS project activity would be insufficient to justify the required investment. For demonstrating the financial unattractiveness of the project activity, project developer has chosen investment barrier using benchmark analysis.

The project developer has chosen project IRR to demonstrate the additionality of the project in line to the guidance 12 of Annex 05, EB 62 which recommends the use of Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.

The project developer has chosen the benchmark as WACC in line to the guidance 12 of the Annex 05 of EB 62 i.e. "In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented."

The PP has considered *local lending rate as the benchmark for the project*.

The PLR as on 27-Aug-2005¹ is considered as the Benchmark for the project i.e. 10.50%.

This was acceptable by the assessment team as *these lending rates are available on the Reserve Bank of India (RBI) website and is in accordance to the guidelines.*

b) Parameters and assumptions used and their cross checks:

Financial indicator calculation is based on the DPR/7/ submitted by the third party, which was available at the time of decision making to project proponents. The approved DPR/7/ have been validated for the input values. The input parameters used, basis thereof and appropriateness are given in the below tables for each stream of the project activity, CARs/CLs have been raised on non-conformities and errors and they have been duly corrected. After closure of all CARs/CLs, validation team arrived at the conclusion that the assumptions and computations in the IRR spread sheet/2/ are in conformity with guidance. The appropriateness and correctness with other crosschecks for all the financial input parameters is described in below table.

Table: Input Parameters

Input parameter/ assumptions	Value, Unit	Validation Remarks
Capacity of the project activity	240 MW	The PP has sourced the value from the DPR/7/, the assessment team has verified the value from the DPR and found to be consistent. The capacity was further crosschecked from the TEC/29/ provided by CEA to PP.
Total Investment Cost	19,460.93 INR (Mn)	The cost is based on the approved DPR and the detail breakup provided in the PD/1/ and validated from DPR/7/ by the assessment team; which was available at the time of decision making. The project cost is approved by the CEA vide its "Techno Economical Clearance"/29/. As the project is located in the hilly region and cost is approved by the financial institute though it is higher, validation team has accepted the cost.

¹ <http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/65634.pdf>

		The project activity is commissioned and the investment cost mentioned in the DPR was compared to the completion cost which is estimated to be 23,215.3 Mn INR. Therefore the value from the DPR was found acceptable by the assessment team. In addition sensitivity analysis is also carried out for the same to ensure the robustness of the project.
O&M Cost (Including Insurance)	1.5% of the project cost (291.91 Mn)	The PP has sourced the value from the DPR/7/ available to PP at the time of decision making, the assessment team has verified the value from the DPR and found consistent with PD/1/ and IRR/2/ sheet. It was observed that CERC tariff regulation 2004/9/ has also recommended O&M cost at 1.5% of the project cost only. Further O&M cost is subjected to sensitivity analysis to check the robustness of the project IRR.
O&M expense annual escalation	6%/annum	The PP has sourced the value from the approved DPR/7/; the assessment team has verified the value from the DPR and found to be consistent. The CERC tariff regulation 2004 also recommends the same rate of annual escalation on O&M cost therefore assessment team considers the escalation considered by PP is realistic and appropriate.
Receivables reserve required for working capital	2 Months of annual fixed cost	The PP has sourced the value from the DPR/7/, the assessment team has verified the value from the DPR and found consistent. Rate is based on CERC Tariff regulations, 2009. CERC Tariff regulation was available at the time of decision making. Validation team checked the document and found the values to be correct.
O&M reserve required for working capital	1 Months of O&M Cost	The PP has sourced the value from the DPR/7/. The assessment team has verified the value from the DPR and found to be consistent. Rate is based on CERC Tariff regulations, 2004/9/. CERC Tariff regulation was available at the time of decision making. Validation team checked the document and found the values to be correct.
Operation life time of the project activity	35 years	The PP has sourced the value from the approved DPR/7/, the assessment team has verified the value from the DPR and found consistent. The operational lifetime was also confirmed at the site from the salient features mentioned about the project at various locations, which was found acceptable to the assessment team. According to Guidelines on the Assessment of Investment Analysis, the project IRR calculations shall reflect the period of expected operation of the underlying project activity (technical lifetime) and it conforms to the requirements of Annex 15, EB 50/31/.

		Validation team checked the documents and found the value to be correct.
Sale price at Bus Bar for first year	4.02 INR/kWh.	The tariff has been computed in the DPR as per CERC formula. Validation team requisitioned the techno economic clearance issued by the CEA/29/ and observed that it states that the tariff of the project shall be regulated by the appropriate Electricity Regulatory Commission (p.4, clause 5). Since the project will be generating power in Jammu & Kashmir and selling power in other States, as per Section 79 (b) of the Indian Electricity Act, 2003 dated 26 May 2003, the tariff would be determined by CERC. Therefore, the tariff has been computed in accordance with applicable regulations available at the time of investment decision. Since the tariff is dependent on the fixed and variable costs, which go on changing year after year, tariff also fluctuates. Such fluctuations in tariff can be observed in other registered projects as well. The sale price at bus bar for first year works out to Rs.4.02/kWh. Thus, assessment team concluded that the tariff applied for investment analysis is reasonable and appropriate in context to project activity.
Salvage value	10% (Same rate for both units)	10% salvage value represents potential profit and therefore it conforms to guidance 4 of Annex 5, EB 62. Salvage value is in conformity with internationally accepted principles and sourced from the article http://www.marshall-stevens.com/pdf/pub_ValueCurves.pdf. Therefore assessment team consider this parameter to be appropriate.
PLF	51.53%	The PP has calculated the PLF based on the gross generation provided in the approved DPR/7/, the assessment team has verified the gross generation and found the value consistent. Hence, the assessment team is of opinion that the value used is in line with the DPR and is sufficient for validation of plant load factor. The plant load factor (PLF) is sourced from DPR and DPR is approved by CEA and is prepared by the third party (Engineering Company), which is in conformity with para 3 (b) of annex-11, EB48 report.
Annual Electricity generation (Gross)	1,083,310 MWh/year	This value is sourced from the approved DPR/7/ which is in turn derived from output of 90% dependable year with 95% machine availability; assessment team has reviewed the DPR and found the value as correct.
Auxiliary Consumption	0.7%	This value is sourced from the approved DPR/7/; assessment team has reviewed the DPR/7/ and found the value to be correct. The auxiliary consumption assumed is also in conformity to the CERC regulations 2004/9/, which also provides the same

		rate for underground hydro power stations.
Debt: Equity	70:30	The financing pattern of the project activity is based on the 70% debt and 30% equity sourced from the DPR/7/. The DPR is approved by CEA vide its TEC/29/. It is in conformance to the CERC regulation hence was accepted by the assessment team.
Interest rate	10%	The interest rate is based on the approved DPR/7/. Since the interest considered by PP is an industrial practice as verified from the other CDM registered projects therefore the same is conservative and accepted to assessment team.
Book Depreciation (SLM)	488.74 INR Mn	PP has considered book depreciation which is a calculated value sourced from the approved DPR/7/ therefore the book depreciation adopted is in conformity with accepted accounting principles. Book depreciation is based on the rates recommended by Schedule XIV of Companies Act/16/. The value is considered correct and appropriate.
Income Tax Depreciation Rate	3.40% (SLM)	This value is sourced from the approved DPR/7/ and in turn derived from the income tax act such that the Depreciation rate (based on written down value) applied is in line with Income Tax Act 1961 of India.
Income Tax Rate	30%	The rate is based on the Income tax rate applicable to the financial year 2005-2006 at which the DPR is submitted. The tax rate is correct and appropriate as verified from the Income Tax rules/30/ applicable for the above timeline. And is in conformity with the guidance 06 of Annex 5, EB 62/23/. The assessment team have validated the provided data source and found it to be correct.
Minimum Alternate Tax	7.50%	The rate is based on the Income tax rate applicable to the financial year in which the DPR is submitted. The tax rate is correct, verified from the Income Tax rules/30/ applicable for the above timeline and appropriate and in conformity with the guidance 06 of Annex 5, EB 62/23/.
Surcharge	10.00%	The rate is based on the Income tax rate applicable to the financial year at which the DPR is submitted. The tax rate is correct, verified from the Income Tax rules/30/ applicable for the above timeline and appropriate and in conformity with the guidance 06 of Annex 5, EB 62/23/.
Education Cess	2.00%	The rate is based on the Income tax rate applicable to the financial year in which the DPR is submitted. The tax rate is correct, verified from the Income Tax rules applicable for the above timeline and appropriate and in conformity with the guidance 06 of Annex 5, EB

		62/23/.
Final tax rates	Income tax rate 33.66% MAT 8.42% Service Tax 10.20%	These are calculated values based on the assumptions validated above. The calculations are done as per the industrial practices, following the IT Rules. The opinion of the financial expert was sought and therefore accepted by the assessment team.
Free power to State (0-30 years)	12% of the net generation	This assumption is sourced from the approved DPR/7/ and further crosschecked by the assessment team with the MOU signed between PP and Government of J & K. This is in line with the hydro policy.

c) Sensitivity analysis:

The Guidance on Assessment of Investment Analysis requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation. The project developer has identified generation, project cost, O&M cost, tariff rate as critical assumptions. These constitute more than 20% of the project cost/revenue. Guidance 20 of Annex 5 of EB 62/23/ states that as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances. The sensitivity analysis reveals that $\pm 10\%$ deviation in the parameters identified will not surpass the benchmark thus the project remains additional.

Table: Sensitivity Analysis:

Parameters	+10%	Base Case	-10%
GENERATION	8.87%	7.60%	6.20%
O&M	7.31%	7.60%	7.87%
PROJECT COST	6.33%	7.60%	9.01%
TARIFF RATE	8.87%	7.60%	6.20%

The validation team confirms that the project would be able to surpass the benchmark only if:

Table: % Variation of Parameters at which they breach benchmark.

Parameters	Breaching Value
GENERATION	24.02%
O&M	-136.01%
PROJECT COST	-19.37%
TARIFF RATE	24.02%

The variation in the chosen parameters is highly unrealistic and unlikely to happen (to the magnitude required to breach the benchmark) for the following reasons:

Net Generation:

The net electricity generation is based on the PLF and the PLF has been sourced from the third party DPR/7/ approved by the CEA/14/ and the value of the PLF is in conformity with the EB 48, Annex 11/32/. The assessment team also reviewed the CERC regulation/9/ which recommends the PLF of 45% for the hydro power plants located in the North East states of India, therefore the assessment team rules out of any possibility of increasing the PLF in future so that the net electricity generation goes above the 24.02%.

Project cost:

The project cost is based on the DPR/7/ approved by the CEA, the reduction of ~19% in future is highly unlikely for the country where the average inflation for the next ten years (Since Decision Making) has been forecasted ~5% by the “Reserve Bank of India/33/. Therefore assessment team rules out the possibility of any reduction of ~30% in project cost in near future.

Tariff:

As stated earlier, the tariff will be regulated by CERC as provided in the “Techno Economic Clearance”/29/ provided to PP by CEA. The tariff rate is computed based on the formula recommended by CEA Tariff Regulations. Therefore, assessment team rules out any possibility of 24.02% increase in tariff to make the project non additional.

3.2.7 Common practice analysis

Since it is a large scale project, common practice analysis is required to be carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality. This is a test to complement the investment analysis to confirm that the project activity is not widely observed and commonly carried out in the region. As required, project developer has analyzed ‘similar’ projects to demonstrate that setting up wind power projects is not a common practice in the identified geographical region.

These steps wise demonstration of common practice analysis as per “Methodological tool: Common Practice, version 03.1” para 5/34/ is included in the final PD/1.3/ and demonstrated in the common practise analysis sheet and is validated as follows:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The size of the project activity is 240 MW, so the applicable output range as defined in the step is +/-50% of the capacity of the proposed project activity. This will come in a range of 120 MW to 360 MW.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions (conditions can be referred from the PD): PP has chosen the entire country as the geographical area for the purpose of common practice analysis.

The validation team validated 50 similar projects, including the registered project activities and project activities undergoing CDM validation. The validation team confirms similar project from the CEA database/19/ (data available before the start date of the project activity). The data for the power plants was validated by the assessment team from the database/19/ published by Central Electricity Authority, Ministry of Power, Government of India. The database is based on the detailed authenticated information obtained from all operating power stations in the country.

N_{Hydro}

Hence, $N_{\text{Hydro}} = 50$

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

The summary of the projects identified (neither registered nor submitted for registration) is given below (The details demonstration is shown in CPA spreadsheet/19/ ;

Technology Area	N(all)
Total hydro project of capacity range (50% to 150%)	47
N_{all}	47

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .

The project proponent analyzed that the project activity that applies different technologies compared to project activity by considering the different investment climate in Jammu & Kashmir. Since Jammu & Kashmir state has special autonomy under Article 370 of the Constitution of India and not all Central are not applicable in the region; project located in state of Jammu and Kashmir have been considered different from the hydro power plants located in other states of India. This was accepted by the assessment team as it is in conformance to the applied tool.

Hence, N_{diff} are the projects located in states other than Jammu and Kashmir; the $N_{diff} = 45$.

Step 5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

As per the approach of the validation team, the factor F is calculated using the following formula;

$$F=1-N_{diff}/N_{all}$$

$$\text{i.e. } F=1-(45/47)=0.043$$

$$\text{a) } F=0.043 < 0.2$$

$$\text{b) } N_{all}-N_{diff}=2$$

Since, F factor is less than 0.2 and $N_{all}-N_{diff}=2$ i.e. <3 ; therefore both the conditions are met as set forth in additionality tool ver.07 in order to demonstrate that the project is not a common practice.

3.2.8 Quantification of GHG Emission Reductions and Removals

The formulas used for calculation are as per applied methodology ACM0002/5/ version 16 and the methodological tool/21/ "Tool to calculate the emission factor for an electricity system" Version 4.

According to the formulae prescribed by the applied methodology, the emission reductions (ER_y) by the project activity during the crediting period is the difference between the baseline emissions (BE_y), project emissions (PE_y) and emissions arising from leakage (LE_y), which is expressed as follows:

$$ER_y = BE_y - PE_y$$

While the leakage is zero in case of renewable energy projects, the emission reductions are equal to the difference of the baseline emissions and project emission due to the project activity. According to the applied methodology, the baseline emissions are demonstrated in PD and are calculated using methodology equations as follows:

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

Where:

BE_y are the baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/y)

$EF_{grid,CM,y}$ is the combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO₂/MWh)

The calculation of $EG_{PJ,y}$ for greenfield renewable energy power plants for this project activity which involves the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, is as follows:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/y)

$EG_{facility,y}$ is the quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/y)

The values used for the calculations are described below:

Parameter	Value	Validation remarks
Installed capacity	240 MW	Confirmed from the DPR/7/
Annual Electricity Generation	10,83,310 MWh	Confirmed from the DPR/7/
Combined Margin Emission Factor	0.9678 tCO ₂ /MWh	Calculated by demonstrating the tool to calculate emission factor, version 4/7/

The equations used for the calculation of baseline emissions as per the methodology is:

$$\begin{aligned}
 BE_y &= EG_{PJ,y} \cdot EF_{grid,CM,y} \\
 &= 1,083,310 \text{ MWh} \cdot 0.9678 \text{ tCO}_2/\text{MWh} \\
 &= 1,048,427 \text{ tCO}_2\text{e}
 \end{aligned}$$

Project emissions (PE) for the project have been taken as zero as described above.

Leakage (L) as per methodology is zero.

Therefore,

$$ER_y = BE_y$$

$$ER_y = 1,048,427 \text{ tCO}_2/\text{year}$$

From the formulas used above it is evident that the proposed project activity fulfils applicable monitoring requirements of the applied methodology/5/, and well supported with the assumed data. The calculations have further been detailed in the excel spread sheet/3/ provided for the project activity. The annual emission reductions estimated for the project activity are 1,048,427 tCO₂e/year, the same value has been validated by the assessment team.

3.2.9 Methodology Deviations

The project activity complies with the applied methodology and no deviation of any sort is applicable for the project activity.

3.2.10 Monitoring Plan

The monitoring provisions (para 15-21) prescribed in the applied methodology /5/ are suitably incorporated in the section 4 of the PD. The necessary monitoring parameters relevant and applicable in the context of the project activity are suitably identified and clearly described under section 4.2 of PD.

Ex ante parameters

The validation of ex ante parameters is described below;

Parameters ex ante	Assessment/Observation
Operating Margin CO ₂ emission factor in year y $EF_{\text{grid,OM},y}$	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0"/21/ 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 10.0/35/, published by the Central Electricity Authority, Ministry of Power, Government of India. Assessment is of the opinion that the value presented in the latest PD/1.3/ i.e. 0.9862, is consistent and applicable to the project activity.
Build Margin CO ₂ emission factor in year y $EF_{\text{grid,BM},y}$	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0"/21/ for the year 2013-2014. The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" version 10.0/35/, published by the Central Electricity Authority, Ministry of Power, Government of India. Validation of the documents makes assessment team conclude that value applied by PP i.e. 0.9495 is consistent and correctly presented for the project activity.
Combined Margin CO ₂ emission factor in year y $EF_{\text{grid,CM},y}$	The combined margin emissions factor is calculated as follows: $EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} * W_{\text{OM}} + EF_{\text{grid,BM},y} * W_{\text{BM}}$ Where: $EF_{\text{grid,BM},y}$ = Build margin CO ₂ emission factor in year y (tCO ₂ /MWh) $EF_{\text{grid,OM},y}$ = 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% $EF_{\text{grid,CM},y} = 0.9678$ (NEWNE Grid)

	Validation team is of an opinion that calculation of the parameter is as per the applied methodology and free from material errors.
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The validation of parameters to be monitored is described below;

Parameters to be monitored	Assessment/Observation
Quantity of net electricity generation supplied by the project plant/unit to the grid in year y $EG_{PJ,y}$	The value applied is 1,083,310 MWh. 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. The parameter is calculated thus QA/QC procedures are as prescribed for separate components of the parameter.
Quantity of Electricity exported by the project to the grid at project site switch yard in year y $EG_{Export,y}$	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 parameter will be monitored continuously but recorded monthly using a tri-vector energy meter of accuracy class 0.2s. Calibration frequency for the meters is set as 5 years which in the view of assessment team is reasonable. For purpose of future verifications invoice raised by the PP to the DISCOM will be available.
Quantity of Electricity imported by the project from the grid at interconnection point of the Regional Supply in year y $EG_{Import,y}$	Quantity of Electricity imported by the project from the grid at interconnection point of the Regional Supply in year y will be monitored continuously and recorded monthly using an energy meter of 0.5s accuracy class. Calibration frequency of the meters is fixed at once in five year which in the view of assessment team is reasonable. Energy imported is the energy used up during start-up, shutdown and the lean period. For purpose of future verification, monthly electricity sales bills raised by State Electricity Board will be available.

Details of the monitoring equipment verified during the onsite assessment by the validation team are as follows:

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

FOR 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

Details of METER installed at interconnection point of Regional Supply Line – 1 (RS-1)

METER for RS-1	
Meter Serial No.	JKB01864
Model	E3M055
Make	SECURE
Accuracy Class	0.5S

The monitoring of energy export and import is continuous with monthly recording through measuring equipment applicable for parameters (export and import) resulting to parameter net electricity supplied in the project activity. The monitoring frequency for parameter is suitably defined and meets the frequency defined in the applied methodology /5/, wherever prescribed. The recording of each parameter is separately listed under each relevant parameter and is suitable with a calibration frequency of once in five years as per the State Authority Guidelines.

3.3 Non-Permanence Risk Analysis

The project activity is commissioned and the technical specifications have been verified against the actual plant specifications. The parameters to be monitored are through electronic meters therefore the likelihood of error is purely systematic in nature. The energy meters are state utility owned and will undergo a calibration check.

Therefore assessment team is of the opinion that the emission reductions are free from any omissions, misstatement and material errors.

3.4 Environmental Impact

The project activity is a large scale hydro project hence lies under the “Category A” classified by the Ministry of Environment and forest, Government of India. As per the Environmental Impact Assessment (EIA) notification dated 14th September 2006 the project requires a Comprehensive Environmental Impact Assessment (EIA).

As discussed in the PD/1/ the EIA report was prepared and environmental clearance was obtained by NHPC on 13/08/2004. Same was made available to the assessment team for review/8/.

3.5 Comments by Stakeholders

The stakeholder consultation took place on 15th May, 2004 at office of the Chief Engineer NHPC Rajarwani, Teshil Uri, District Baramulla. The meeting was held in the form of environmental public hearing and notice was issued on 07/04/2004 and 09/05/2004/18/. An adequate participation of the local stakeholders at all the levels was ensured and is evident from the information sheet of the consultation process checked by the validation team. A summary of the comments received included in section 6 of the PD/1/ along with the Minutes of the Meeting/18/ were reviewed and it can be concluded that the local residents were positive about the project.

After completion of the public hearing, the final EIA & EMP reports and executive summary, Detailed Project Report (DPR) and proceedings of Public Hearing were submitted to MoEF for

appraisal by the Expert Appraisal Committee (EAC) of MoEF. After recommendation of EAC, Environmental clearance was issued to the project on Date 13-Aug-2004.

During the site visit few representatives were interviewed and no negative outcome of the project was brought out.

4 VALIDATION CONCLUSION

Earthood Services Private Limited (Earthood) has been contracted by EKI Energy Services Limited to perform a validation of the project: Uri II Hydroelectric Project

The validation was performed in accordance with the VCS Standard version 3.5, latest version of Validation and Verification Manual and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The proposed VCS project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change. In our opinion, the project meets all relevant VCS criteria and all relevant host country criteria.

The project correctly applies methodology ACM0002 version (Version 16.0). It is demonstrated that the project is not a likely baseline scenario. The emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be 10,484,270 tCO₂e over 10 years of first crediting period starting 25/09/2013, averaging 1,048,427 tCO₂e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not change.

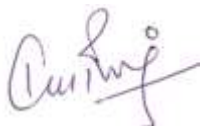
As a result of validation 12 Corrective Action Requests (CARs) were raised and satisfactorily resolved. There is no Forward Action Request (FAR) raised during the validation process.

The review of the VCS PD, corresponding annexures (ER, Financial and CPA Spreadsheet) and additional documents related to baseline and monitoring methodology and subsequent background investigation have provided Earthood Services Private Limited (VVB) with sufficient evidence to validate the fulfilment of the stated criteria.

The validation conclusions can be summarised as under:

- A reasonable level of assurance was applied;
- All data and information used for ex-ante calculation of emission reductions is primarily based on historical in nature and part of which is projected;
- The project is in line with all relevant host country legislation;
- The project additionality is adequately justified in the VCS-PD;
- The monitoring plan is feasible, transparent and adequate;
- No deviations from the selected methodology/tool were applicable/applied;
- The calculation of the project's emission reductions was carried out in a transparent and conservative manner, so that the calculated emission reductions of 10,484,270 tCO₂e is most likely to be achieved within the 10 year crediting period with an average annual emission reduction of 1,048,427 tCO₂e.

The conclusions of this report demonstrate that the proposed VCS project, as described in the VCS PD, conforms to all applicable validation criteria.



Dr. Kaviraj Singh

Managing Director

Earthood Services Private Limited

28/12/2015

Gurgaon, Haryana, India

APPENDIX 1:

S. No	Name of document
1	1.1 PD version 1.0 dated 1.2 PD version 3.0 dated 15/06/2015 1.3 PD version 5.0 dated 16/10/2015
2	IRR spreadsheet
3	ER spreadsheet
4	VCS Validation and Verification Manual version 3.0 dated 04/10/2012
5	Approved consolidated methodology; ACM0002, V16.0.0, " Consolidated baseline methodology for grid-connected electricity generation from renewable sources ", Valid from 11 May, 2012 onwards
6	Copy of Approval from the President of India for setting up the Uri II Hydroelectric Project Stage – II (240 MW) in J&K
7	Approved "Detailed Project Report (DPR)" from NHPC for the capacity 240 MW dated August 2003, Volume I
8	EIA report of Uri Hydroelectric Project Stage – II prepared by Center of Research for Development, The University of Kashmir, Srinagar dated February 2004
9	CERC tariff regulation 2004 issued from "Central Electricity Regulatory Commission"
10	Consent to Operate obtained from J&K State Pollution Control Board dated 03/07/2014
11	Copy of Memorandum Agreement (MoA) signed between "Ministry of Power, Govt of India." & State Government of Jammu & Kashmir for the proposed project dated 20/07/2000
12	Fitness certificate of 4 X 60 MW Uri II HEP being commissioned in District Baramulla, Kashmir dated 07/10/2013
13	Power purchase agreement signed between the National Hydroelectric Power Corporation Ltd. and various states.
14	CEA CO ₂ Baseline Database for Indian Power Sector, Central Electricity Authority, Government of India version 07 (http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)
15	Salient features brochure for URI II
16	Schedule XIV of Companies Act, 1956, Point II (b) of http://www.vakilno1.com/bareacts/companiesact/schedule/schedule14.htm
17	Attendance Sheet used during the site visit on 27/03/2015 and 28/03/2015
18	18.1 MoM & Attendance Sheet for local stakeholder consultation process 18.2 Copy of public notice to invite the local stakeholders.
19	19.1 "The spreadsheet for the demonstration of "Common Practice Analysis". 19.2 The CEA database used for the selection of hydro power plants for the demonstration of "Common Practice Analysis"
20	Copy of EIA report and its approval for the 240 MW from the "Ministry of Environment & Forest"
21	"Tool to calculate the emission factor for an electricity system", Version 04, EB 75 Annex 15, dated 04/10/2013
22	"Tool for the demonstration and assessment of additionality", Version 07, EB 70 Annex 08 dated 23/11/2012
23	Guidelines on the Assessment of Investment Analysis – Version 05, Annex 5, EB 62nd, valid from 15th July 2011
24	Rates of depreciation for income tax; AYs 2003-04 to 2005 to 06 http://www.incometaxindia.gov.in/charts%20%20tables/depreciation%20rates.htm
25	Methodological tool: Common Practice version 3.1 dated 03/06/2015
26	Guidelines for the reporting and validation of plant load factors, Annex-11, EB48 Report
27	Glossary of CDM Terms, Version 06.0, Annex-63, EB66 Report
28	UNFCCC website: http://cdm.unfccc.int/Reference/Guidclarif/index.html#meth . http://cdm.unfccc.int/methodologies/PAmethodologies/approved
29	Techno Economic Clearance by CEA.

30	Income Tax Rules as issued by Income Tax Department, Government of India. http://www.incometaxindia.gov.in/pages/rules/income-tax-rules-1962.aspx
31	Tool to determine the remaining lifetime of equipment, Version 1, Annex 15, EB 50 https://cdm.unfccc.int/EB/050/eb50_repan15.pdf
32	'Guidelines for the reporting and validation of Plant load factors' Version 01, EB 48, Annex 11. https://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid35.pdf
33	Agreement on Monetary Policy Framework, dated 20/2/2015 http://finmin.nic.in/reports/MPF/Agreement28022015.pdf
34	Methodological Tool 'Common Practice' Version 3.1 http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-24-v1.pdf
35	CEA 'CO ₂ Baseline Database for Indian Power Sector' Version 10.0. Dated December 2014 http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf
36	http://www.alstom.com/press-centre/2014/5/alstom-successfully-commissions-uri-ii-hydroelectric-project-in-india/

APPENDIX 2: FINDINGS

Type	Date	22/04/2015
CAR # 1	Reference	Section of Val protocol
Description of the Non Conformance		
- The applied methodology mentioned in section 1.2 of the PD is inconsistent and also not applicable for the concerned project activity. - PP is requested to kindly provide supportive for the indicated start date mentioned in section 1.5. - In section 1.11 of PD version 1 all the regulatory guidance, laws or treaties concerning hydro power generation.		
1st Response from PP	Date	02/05/2015
- applied methodology mentioned in section 1.2 of the PD has been corrected to ACM0002 ver 16 - Commissioning Certificate is being submitted along with this submission. Further same can also be checked at the below weblink of the NHPC Website : http://www.nhpcindia.com/projectdetail.htm?CatId=1&ProjectId=14 - Section 1.11 is revised, various clearances and/or approvals received for development of the project have been tabulated which implies compliance with all relevant local, regional and national laws, statutes and regulatory frameworks		
1st Assessment by Audit Team	Status	Closed
	Date	10/06/2015
- The revised PD mentions the same methodology at all the places. - The project start date which is the commissioning date could be confirmed from the commissioning certificates provided. - The revised section contains information related to the project. Hence accepted.		

Type	Date	22/04/2015
CAR # 2	Reference	Section of Val protocol
Description of the Non Conformance		
Section 1.8 of the PD version 1 is not inline to the VCS PD template; entire information pertaining to the equipment and project could not be found. The layout plan provided in the PD is also not legible.		
1st Response from PP	Date	05/05/2015
Section 1.8 of the PD has been updated and is made in line with VCS PD template and the entire information pertaining to the equipment and project has been updated. As the Layout plan was not legible it has been removed.		

1 st Assessment by Audit Team	Status	Open	Date	10/06/2015
The revised section includes information which varies from the supportive provided. PP is requested mention the actual technical specifications clarifying any change in the project design from the time of project inception (DPR) justifying the changes. PP is requested to include a legible layout plan of the project In the applicability condition 3, PP has discussed the calculation of power density, which could not be traced in the PD.				
2 nd Response from PP			Date	15/06/2015
The technical specifications as mentioned in the VCS PD is confirms to the actual implementation. The project design has not been altered from the time of project inception (DPR). However, minor changes during the constructions were carried out based on the site specific conditions. These changes have not impacted the technical specifications or the project design of the project activity. Layout plan of the project is now being incorporated in the Revised PD, DOE requested to refer the same. Power Density Calculation is now included in the applicability condition 3, DOE is requested to refer the same.				
2 nd Assessment by Audit Team	Status	Closed	Date	20/06/2015
The technical specifications included in the PD conforms to both DPR and onsite observations hence it is accepted that there have been no changes in the design specifications. The layout plan included is now legible. The power density calculation are correct as included in the revised PD.				

Type		Date	22/04/2015	
CAR # 3		Reference	Section of Val protocol	
Description of the Non Conformance				
The following discrepancies were found in section 2.5 of the PD: a) The description in the PD is not project specific. b) The final IRR does not confirm to the supportive provided. c) Kindly follow the “Guidelines on the assessment of investment analysis”and provide information transparently. d) In step 4; PP needs to provide justification for adopting the geographical area as Jammu and Kashmir however the “Guideline on common practice” suggests Host country as applicable geographic area,				
1 st Response from PP			Date	05/05/2015
Section 2.5 of the PD has been updated: a) The description in the PD is revised and made project specific. b) IRR Details have been updated & are in line with the IRR sheet provided to the DOE. c) Source of input parameters used for IRR Calculation have been transparently provided in the revised PD. d) Host Country India is now considered as the geographical area for common practice analysis				
1 st Assessment by Audit Team		Status	Open	Date 10/06/2015
- PP is required to include all the steps of the applied tool, justifying the applicability or non applicability. - Sale price in the DPR provided is 4.02 Rs/Unit which is inconsistent with the value used for calculations. - PP needs to provide all the related pages of the DPR from where the values have been sourced. The sections provided does not include fields such as loan tenure, escalation in operation expense. - The land cost is inconsistent in the PD and the supportive provided.				

In common practice analysis, PP is requested to revisit the calculation sheet as many of the similar projects have not been considered. Also kindly explain the different investment climate in J&K for hydro project.					
2 nd Response from PP			Date	12/06/2015	
- All the steps of the applied tool has been included along with the justification for applicability or non-applicability in the revised PD, DOE is requested to refer the same. - Sale price for each year is now considered as per DPR. - DOE is requested to refer “Calculation of Energy Rate as per Tariff Notifications” sheet in DPR which shows detailed calculation of energy rate per unit for each year using the input parameters which show outstanding loan till 12 years and escalation in operation expense @6%. - Land cost is made consistent in the PD with the supportive provided. - DOE is requested to refer the Common Practice Sheet all the similar project have been considered. With reference to Methodological tool: Common Practice, version 03.1 para 12 (d) (iv); Investment climate has been considered for identifying Different technologies, as each state in India has different set of policies and legal regulations. The project activity is located in the state of J&K of India and the policies and legal regulations applicable for the project is regulated by J&K Government. Therefore, it can be assumed that the policies and legal regulations are different in different states and hence projects installed in other states have been considered in Ndiff. From the identified projects in Nall located in states other than Jammu & Kashmir come under different investment climate and have been considered under Ndiff.					
2 nd Assessment by Audit Team		Status	Closed	Date	20/06/2015
- The revised PDD includes all the steps. - The sale price is included in the revised documents therefore it is accepted. - The information required could be obtained from the paragraphs mentioned in the DPR. - Based on the clarification provided by the client and in opinion of the technical expert it is fair to exclude projects on grounds of policies in different states. Therefore it was accepted.					

Type		Date	22/04/2015	
CAR # 4		Reference	Section of Val protocol	
Description of the Non Conformance				
Combined Margin grid emission factor used for the calculation of emission reductions could not be found in either section (ex-ante or monitored) of the PD.				
1 st Response from PP		Date	05/05/2015	
Combined Margin grid emission factor used for the calculation of emission reductions is now included in section 4.1 of the PD, kindly refer the revised PD				
1 st Assessment by Audit Team	Status	Closed	Date	10/06/2015
The combined margin could be found in the revised PD.				

Type	Date	22/04/2015
CAR # 5	Reference	Section of Val protocol
Description of the Non Conformance		
The project activity involves the monitoring of net electricity; kindly clarify a) Where will the data be sourced from b) The auxiliary consumption of the hydroelectric plant is unaccounted for?		

c) The details of the meters installed have not been included in the relevant section.					
d) The calculation method has not been attended.					
1 st Response from PP			Date	05/05/2015	
a) Net electricity generated and supplied to grid is a calculated value whereas EG _{export} is sourced from 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. Kindly refer the revised PD Section 3.1 & 4.2; source of data is mentioned					
b) Kindly refer the revised PD Section 3.1 & 4.2; auxiliary consumption of the hydroelectric plant is now accounted in the calculation of net electricity generated and supplied to grid.					
c) The details of the meters installed have now been included in the relevant section.					
d) The calculation Net electricity generated and supplied to grid is now incorporated in the revised PD Section 3.1 & 4.2.					
1 st Assessment by Audit Team		Status	Open	Date	10/06/2015
a) From the description provided it is not clear if the metering would take place at the project site switch yard or sub- station. PP is required to provide consistent information.					
b) Auxiliary consumption has been fairly stated in the revised documentation.					
c) The meter details could not be traced in the PD					
d) The calculation included is in accordance with the applied methodology.					
2 nd Response from PP			Date	15/06/2015	
a) Metering takes at the project site switchyard same has been updated in the revised PD					
c) For the meter details please refer the revised PD Section					
2 nd Assessment by Audit Team		Status	Closed	Date	20/06/2015
a) The description is inline to the onsite observations.					
c) the meter details have been incorporated in the revised PDD and the details were found consistent to the onsite observations.					

Type			Date	22/04/2015	
CAR # 6			Reference	Section of Val protocol	
Description of the Non Conformance					
During the onsite visit, three notations for the meters were found: main meter, check meters and stand by meters. The monitoring plan in PD version 1 does not describe the metering arrangement discretely.					
1 st Response from PP			Date	28/04/2015	
Three notations for the meters main, check & standby meters are now described in the monitoring plan of the revised PD, kindly refer the same					
1 st Assessment by Audit Team		Status	Open	Date	10/06/2015
PP is required to include a flow chart indicating the metering setup for further clarity.					
2 nd Response from PP			Date	12/06/2015	
Kindly refer the Project Boundary for the metering setup. The metering points have been clearly indicated for all the components.					
2 nd Assessment by Audit Team		Status	Closed	Date	20/06/2015
The Metering setup could be clearly seen in the project boundary diagram. Therefore finding is closed.					

Type	Date	13/07/2015
CAR # 7	Reference	Section of Val protocol
Description of the Non Conformance		

The source of salvage value and land cost is not mentioned in PD.				
1 st Response from PP		Date	13/07/2015	
The source of salvage value and land cost is now mentioned in PD. DOE is requested to refer the same.				
1 st Assessment by Audit Team	Status	Closed	Date	15/07/2015
The source of salvage value and land cost could be found in the revised version (version 4.0) of PD. Thus CAR# 7 stands closed.				

Type			Date	13/07/2015	
CAR # 8			Reference	Section of Val protocol	
Description of the Non Conformance					
Value of service tax mentioned in PD is not consistent with IRR sheet (cell C66_Assumption). Service tax mentioned in PD is 10.320% whereas IRR sheet mentions 10.20%.					
1 st Response from PP			Date	13/07/2015	
Value of service tax in PD is made consistent. DOE requested to refer the same.					
1 st Assessment by Audit Team		Status	Open	Date	15/07/2015
The value of service tax in PD is not consistent with IRR sheet. Cell number C66 on worksheet 'Assumptions' mentions service tax to be 10.20% whereas, PD on page number 22 mentions service tax to be 10.320%					
2 nd Response from PP			Date	28/07/2015	
The PD has been revised for consistent value and revised copy (version 4.0) has been provided to the DOE.					
2 nd Assessment by Audit Team		Status	Closed	Date	30/07/2015
The required corrections have been done and values are consistent now. Thus CAR#8 stands closed.					

Type			Date	13/07/2015
CAR # 9			Reference	Section of Val protocol
Description of the Non Conformance				
Threshold limit for variation in tariff and project cost at which the project IRR crosses the benchmark is not consistent with IRR sheet.				
1 st Response from PP			Date	13/07/2015
Sensitivity analysis table in the PD has been updated & made consistent with the IRR Sheet				
1 st Assessment by Audit Team	Status	Closed	Date	15/07/2015
The revised version of PD (version 4.0) contains consistent information. Thus CAR#9 stands closed.				

Type	Date	13/07/2015
CAR # 10	Reference	Section of Val protocol
Description of the Non Conformance		
Details of Common Practice Analysis in PD mentions 14 similar projects in step 2, however in step 3, N _{all} is written as 12.		
1 st Response from PP	Date	13/07/2015
As per “Methodological tool: Common Practice, version 03.1” para 14		
Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the conditions provided in para		

14 (a) to 14 (f)

Therefore In Step 2, Similar projects (CDM and Non-CDM) are identified & their Numbers are recorded as $N_{\text{Hydro.}}=14$

As per "Methodological tool: Common Practice, version 03.1" para 15

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

Hence, in step 3 number of project which are Non CDM are identified from the similar projects identified in Step 2 and recorded as $N_{\text{all}}=12$

Hence the Common Practice Analysis calculations are in line with the Methodological tool: Common Practice, version 03.1.

1st Assessment by Audit Team	Status	Closed	Date	15/07/2015
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The information provided in the revised PD is acceptable now and a revised CPA sheet has also been submitted. The information is consistent and accurately given in PD. Thus this CAR stands closed.

Type		Date	13/07/2015
CAR # 11		Reference	Section of Val protocol
Description of the Non Conformance			
It is not clear whether parameter $EG_{PJ,y}$ is measured or calculated. The information provided regarding the monitoring of this parameter in the table are contradictory.			
Also as per the methodology ACM 0002 V.16, values of $EG_{PJ,y}$ shall be cross checked with the sales receipt/invoices but no such information is mentioned in PD.			
1 st Response from PP		Date	13/07/2015
Parameter $EG_{PJ,y}$ is calculated as $EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$. The information provided regarding the monitoring of this parameter in the table has been revised in the PD.			
As $EG_{PJ,y}$ is a calculated value, therefore QA/QC procedure is provided for individual parameters $EG_{Export,y}$, $EG_{Import,y}$.			
$EG_{Export,y}$ can be cross checked from the invoice raised by the PP to the DISCOM $EG_{Import,y}$ is sourced from the electricity sales bills raised by State Electricity Board, which is a government organization responsible for monitoring the electricity, thus the values are authentic and credible.			
Further, this data may be cross checked with the Log books available at project activity site which monitors and record monthly data. However, the data recorded in the log book may not the same as the time of recording the data would be different between the plant log book and actual reading by the electricity board			
1 st Assessment by Audit Team		Status	Closed
		Date	15/07/2015
The information provided in the revised PD is acceptable now. The information is consistent and			

accurately given in PD. Thus this CAR stands closed.

Type	Date	13/07/2015
CAR # 12	Reference	Section of Val protocol
Description of the Non Conformance		
Details of energy meter used to measure $EG_{import,y}$ is not provided in the PD.		
1st Response from PP	Date	13/07/2015
Details of energy meter used to measure $EG_{import,y}$ is now provided in the revised PD.		
1st Assessment by Audit Team	Status	Open
	Date	15/07/2015
Details of energy meter used to measure $EG_{import,y}$ could not be located in the revised version of PD (Version 4.0).		
2nd Response from PP	Date	28/07/2015
Details of energy meter has been added in the revised PD.		
2nd Assessment by Audit Team	Status	Closed
	Date	30/07/2015
Latest PD, Version 4.0, has the required details. Thus CAR#12 stands closed.		

Type	Date	15/10/2015
CAR # 13	Reference	VCS report
Description of the Non Conformance		
a) Section 1.3 of the project description states the project proponent. Section 1.4 of the project description states the other entity involved in the project. b) Section 2.5 of the project description describes the project proponent's approach to condition (f). The project description states that condition (f) is defined using the period of time between the ratification of the Kyoto Protocol and the date on which the project description was listed.		
1st Response from PP	Date	16/10/2015
a) Section 1.4 of PD mentions EKI Energy Services Limited as VCS Consultant to the project activity .The same entity had signed Contract with DOE for VCS Validation. Communication agreement has been signed between NHPC and EKI Energy Services Limited and the same has been submitted to DOE for perusal. b) The same had been corrected & now in-line with the requirements. Kindly do refer Section 2.5 of the revised PD.		
1st Assessment by Audit Team	Status	Closed
	Date	20/10/2015
a) The revision was found in compliance to the signed document and agreement submitted. Hence closed. b) The CPA has been revised to include all the projects in-line to the guidelines; revised CPA sheet and PD submitted were found acceptable to the team hence closed.		

APPENDIX 3: CV OF THE TEAM

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M. Sc. (Climate Science and Policy)		
Experience	3+ Years Completed more than 15 CDM projects and 2 GS projects		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Ashok Gautam	Date	14/11/2014
Approved by	Kaviraj Singh	Date	14/11/2014

Competence Statement			
Name	Abhishek Mahawar		
Country	India		
Education	B. Tech. (Chemical Engineering) MBA (Finance)		
Experience	7 Years		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Ashok Gautam	Date	29/12/2014
Approved by	Kaviraj Singh	Date	29/12/2014

Competence Statement	
Name	Anshika Gupta
Country	India
Education	M.Sc. (Climate Science & Policy), TERI University
Experience	8 months

Field	Climate Change		
Approved Roles			
Team Leader	NO		
Validator	YES (trainee)		
Verifier	YES (trainee)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (1.2, 3.1)	YES (trainee)		
Reviewed by	Abhishek Mahawar	Date	01/07/2015
Approved by	Ashok Kumar Gautam	Date	01/07/2015