300MW HYDROPOWER PROJECT BY JHPL

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 Baspa project is a run-of-the-river hydro-electric power plant with an installed capacity of 300 MW. The diversion barrage of the project is located across river Baspa, one of the major tributaries of the river Sutlej, at Kuppa in Himachal Pradesh. The power house is located at Karcham village in Kinnaur District. The project activity was an initiative of Jaiprakash Hydro Power Limited (JHPL) a part of the Jaypee Group. The purpose of the project activity is to generate electricity using renewable hydro energy and sell it to Himachal Pradesh State Electricity Board (HPSEB).

The project activity is a run-of-the-river hydro project which supplies power through Indian Grid. INDIAN grid is operating with a mix of hydro, nuclear and fossil fuel power plants. Prior to the start of the project activity the existing demand in the Northern Region Grid was met through its existing fossil fuel based (coal, gas and diesel), nuclear, hydro and renewable energy-based power plants.

From 01-September-2015 onwards, the Himachal Baspa Power Company Ltd. (HBPCL) has owned this hydro power plant and its name changed to JSW Hydro Energy Limited[1] from 01-September-2018 thus JSW Hydro Energy Limited is the new owner who is acting as project proponent for the project activity.

The 300 MW hydro power project was implemented in three phases for three units –

Unit No.	Date of Commissioning
Unit I	24-May-2003
Unit II	29-May-2003
Unit III	08-June-2003

The run-of-river hydro-Power project consists of three units with installed capacity 100 MW each making total installed capacity of 300 MW.
The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions. Also, the project is renewable crediting period activity and has completed its 1st crediting period and now reducing the carbon emission for the 2nd crediting period. For this crediting period estimated carbon emission reduction is 1,212,379 tCO_2e/annum. This is the 16th verification activity of the current project activity for the duration 01-August-2021 to 31-July-2022 (inclusive of both days). Also, during the current monitoring period, 1,276,829 tCO_2e of emission avoidance as a result of supplying 1,376,932.94 MWh clean electricity to grid.

[1] The relevant document for company name change has been provided

In current monitoring period, it has been operational with normal schedule with scheduled maintenance, plant breakdown has occurred during the current monitoring period, total breakdown duration is calculated as 7 hours 40 minutes, this can be checked from Appendix 2 of the monitoring report wherein the breakdown details have been mentioned. No significant impacts have occurred due to plant breakdown on the GHG emission reduction from the project activity and monitoring process of the project activity.

1.2 Sectoral Scope and Project Type

Sectoral scope 1: Energy Industries (renewable / non-renewable sources).

Project type: Renewable energy project

Methodology: ACM0002: Grid-connected electricity generation from renewable sources- version 17.0

The project activity is not a grouped project

1.3 Project Proponent

Organization name	JSW Hydro Energy Limited (formerly Himachal Baspa Power Company Ltd)
Contact person	Mr. Anil Kumar Thakur
Title	Plant Engineer
Address	Karcham- Wangtoo H.E. Project, Sholtu Colony, P.O. Tapri, Sholtu, Himachal Pradesh 172104, India
Telephone	+ 91 7018858819
Email	Anilkumar.thakur@jsw.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Shubham Pagare
Title	Executive
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India

Telephone	+91-9109763267
Email	registry@enkingint.org or shubham.pagare@enkingint.org

1.5 Project Start Date

The project start date is earliest date of commissioning of the Unit-I i.e. 24-May-2003.

1.6 Project Crediting Period

Duration: 10 years 00 month

Type: Renewable twice

The project activity is a renewable crediting period project activity. [2]

First Crediting Period: 01-April-2006 to 31-March-2016 (inclusive of both days)

Second Crediting Period: 01-April-2016 to 31-March-2026 (inclusive of both days)

1.7 Project Location

The project site is located about 210 Km from Shimla. Shimla is connected to the project site by National Highway-22 (Hindustan Tibet Road). Nearest broad gauge railway station from the project site is Kalka which is about at a distance of 300Km from the project site. The geographical location of the power house is between Longitude 78°11'23'' East and Latitude 31°29'48'' North . Location is depicted in following maps-

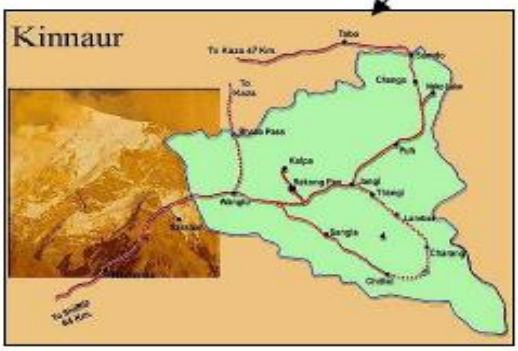
[2] This project is duly registered as per VCS standard 3.7 as per the validation report, in accordance with 3.8.1 of VCS standard 3.7 the project crediting period shall be a maximum of ten years which may be renewed at most twice. Please refer : https://verra.org/wp-content/uploads/2020/11/PREVIOUS-VERSION-VCS-Standard-v3.7.pdf



Location of Himachal Pradesh in India



Location of Kinnaur district



1.8 Title and Reference of Methodology

Methodology: ACM0002 ver. 17.0 (EB 89, Annex 1)[3]
Methodology Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM[4].

The methodology also refers to the latest approved versions of:

- Tool to calculate the emission factor for an electricity system, Version 06.0 (EB 97, Annex 7)[5]
- Tool for the demonstration and assessment of additionality, Version 05.2(EB 39, Annex 10)[6]

[3] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

[4] https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

1.9 Participation under other GHG Programs

The project activity is neither registered nor seeking registration in any other GHG program. The project proponent has also provided undertaking that it will not claim any GHG credits in any GHG program other than that under VERRA during the current monitoring period.

1.10 Other Forms of Credit

India is Non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. The project is neither registered nor seeking registration in any other GHG program. The project proponent (PP) has submitted undertaking that they will not claim any GHG credit in any GHG program other than that under VERRA for the same monitoring period. PP is not taking any National (eg REC) and International renewable energy attributes (eg IREC) for the same crediting period. PP would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. PP has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration.[7]

1.11 Sustainable Development Contributions

Contribution to sustainable development:

The project activity has beneficial effect on the local environment and employment in the nearby region. Clean Electricity generation through Hydro Project result in avoidance of consumption of fossil fuels which results in contribution to SDG 7. The emission avoidance through these activities results in contribution to SDG 13. All the workers at site are trained which results in increase of skills, which contributes to SDG 4. Detailed indicators are mentioned in table 1. This is a voluntary project activity doesn't contribute to achieving any nationally stated sustainable development priorities. Project officials has taken decision to keep all the employees on permanent basis working at the project activity. There is no compliance for monitoring and reporting the emission reduction and SDG contribution from the project activity.

[7] https://www.recregistryindia.nic.in/index.php/publics/registered_regens

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1.	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 1,376,932.94 MWh renewable electricity has supplied to Indian grid during the reported period (16th monitoring activity) that helps to increase the renewable energy share in the energy mix.	1,376,932.94 MWh renewable electricity has supplied during current monitoring period. The current and lifetime SDG contribution are same as no SDG reporting has been done previously.
2.	4.4	4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill	Implemented activities to increase	Together with the technology supplier, the Project organize 49 training during current monitoring period. Training related to soft and technical skills.	Overall, 49 trainings are provided during over project lifetime. The current and lifetime SDG contribution are same as no SDG reporting has been done previously.
3.	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to avoid	By supplying 1,376,932.94 MWh clean electricity (generated through Hydro project) to Indian grid, the project avoided release of 1,276,829 tCO_2e in to the atmosphere during the reporting period.	The project activity prevented the release of 1,276,829 tCO_2e into the atmosphere. The current and lifetime SDG contribution are same as no SDG reporting has been done previously.

2 SAFEGUARDS

2.1 No Net Harm

The Environment Impact Assessment study was conducted for the project activity and judicious efforts to cause minimal impacts on the surrounding environment and to maintain the natural balance.

Environmental Impact

The host party for the project activity is India. At the time when Baspa project was implemented, there was no specific requirement of prior consideration of an EIA study for large hydro power projects as per MoEFCC[8] guidelines. However, in order to receive financing for the project, it was a requirement of the lenders to have an EIA study conducted for this project. Hence it was necessary for JHPL to carry out an EIA study which was done by a well- known organization, NEERI (National Environmental Engineering and Research Institute) in 2002. In addition, another study for the purpose of a social audit was done by Sharnam Seva Samiti in the year 2007. The environmental studies were undertaken to study the impacts of project activity on environment.

The environmental impacts associated with the project activity are as follows:

Air and Noise environment: The air quality and noise levels were assessed at different stations. All stations recorded SPM concentration below the central pollution board standard. The levels of gaseous air pollutants, viz. SO_2 and NO_2 were below the detectable limit of 6 $\mu g/m^3$. The noise levels for the residential area were in the range of 40 to 50 dBA and in sensitive areas i.e. schools and hospitals were in the range of 40 to 45 dBA and are well within the Central Pollution Control Board standards for residential and sensitive areas.

Water environment: The water quality of Baspa River for physical, chemical and heavy metal concentration is within permissible limits as the selected analytical parameter for assessment of water quality, the samples were preserved and brought to NEERI, Nagpur as per clause 1.8.4.2 of EIA report[9]. There is no organic pollution as no major sources of domestic or industrial discharge in the river. Bacteriological quality of ground water sources does not show faecal contamination.

Land environment: The total land required for various activities of the project is 65.1584 ha and include forest land (44.1795 ha), Govt. land (7.0675 ha) and private land (13.9111 ha). The forest land to be utilised does not cover extensive forest or trees or endangered species.

Biological environment: The project activity does not cause any significant disturbance to the ecosystem. The plant species of the project area are neither endemic nor rare and endangered. There are no any significant adverse impacts of the project activity on wildlife, mammals, reptiles and migratory birds in the project area. Further, Rukcham-Chitkul wildlife sanctuary is located at

[8] Since June 2014, the name of CDM DNA of India changed to Ministry of Environment, Forest and Climate Change (MoEFCC)

[9] As per the EIA report, refer clause 1.8.4.2 of Water Environment.

5 km off the Baspa site and does not have any adverse impact on the sanctuary due to the project activity. The baseline status of the aquatic environment with reference to flora and fauna in the Sutlej has been studied. The Shannon diversity Index and Palmer's pollution Index values show that the river water is not polluted with sub-optimal levels of nutrients.

Socio-economic environment: The impact of construction on local labour force availability is highly significant. Increased income resulted in increased imports of labourers to the area and further income was generated by servicing the workforce. The construction of the power project triggers an all-round increase in development activities such as housing, transport and education and those have significant positive impact on the life style of the population. In sum the overall impact of the project on the socio-economic environment is expected to highly beneficial and positive.

Summary:

The work on the Environmental Management Plan (EMP) as per the NEERI report for the project is ongoing. The project proponent has sanctioned INR 20 crores (INR 200 Million) to GoHP as per the CAT Plan and along with the GoHP officials has undertaken efforts to re-vegetate the area. Almost 50% of the compensatory afforestation work is completed with a survival rate of 75- 80% of the plants. The project proponent has constructed cement walls along the side of the river banks and roads to stabilize the area and prevent erosion. The PP has also installed an Effluent Treatment Plant (ETP) at the Sholtu site to treat the domestic wastewater from colonies before discharging it into the river. The PP also maintains a flow of 5 cusecs while releasing the water to maintain the downstream flow as per the Power Purchase Agreement. Thus it may be concluded that the project promoters have made judicious efforts to cause minimal impacts on the surrounding environment and to maintain the natural balance.
During the current monitoring duration, no potential negative environmental and socio-economic impacts identified.

2.2 Local Stakeholder Consultation

The Stakeholder Consultation Report primarily deals with socio-economic impact of the project activity and provided an opportunity for the local population to express their viewpoints and comments with respect to the project.

Before implementation of the project activity, the project proponent did thorough consultation with stakeholders – identifying the stakeholders, consultation with the stakeholders in number of phases and through number of media – focus group discussion, detailed social mapping and fieldwork, inclusion of local stakeholders from all sections of community , explanation of project activity – purpose and details to them and resolving the comments/ grievances along with seeking suggestions from them. The PP has engaged a number of local NGOs for local stakeholder consultations by applying various strategies to engage them in project and for taking care of their complaints/grievances/suggestions. The process is ongoing and continuous; this process is undertaken throughout the year.

During the current monitoring period, the project proponent has engaged with the local stakeholders in different ways including various Corporate Social Responsibility (CSR) activities undertaken by the company.

The PP has been actively involved in a number of CSR initiatives, including the Charkha and Shikhar programs. The Charkha program is designed to empower women by providing them with training and employment opportunities in the field of handloom crafting. Through this program, women learn how to use traditional handloom techniques to create a variety of items, such as fabric, clothing, and other decorative or functional pieces. Once they have completed their training, they can sell their creations through the Charkha program and may also receive a certificate acknowledging their skills and achievements.

The goal of the Charkha program is to support local women by giving them the tools and skills they need to become economically self-sufficient and contribute to their communities. By providing training and employment opportunities, the program helps to increase the income and economic stability of participating women and promotes the preservation and revival of traditional handloom techniques.

In addition to the Charkha program, the PP is also involved in the Shikhar program, which promotes sports and encourages physical fitness among young students. The Shikhar program focuses on high altitude boxing academies (HABA) and provides students with fellowships, training, and nutrition to help them excel in the sport. The program also offers medical check-up assessments and provides head coaches to guide and mentor students. In addition to supporting athletes, the Shikhar program promotes sports and physical activity among kids in the community by providing training and resources. Overall, the Shikhar program is dedicated to improving the health and well-being of the community through the promotion of sports and physical activity.

Besides, PP has kept grievance register in plant site office seeking complaints/grievances from local community and grievance has also been digitally recording through e-mail process. There has also been the provision of receiving letters from local community for any suggestion/comment/complaint.

2.3 AFOLU-Specific Safeguards

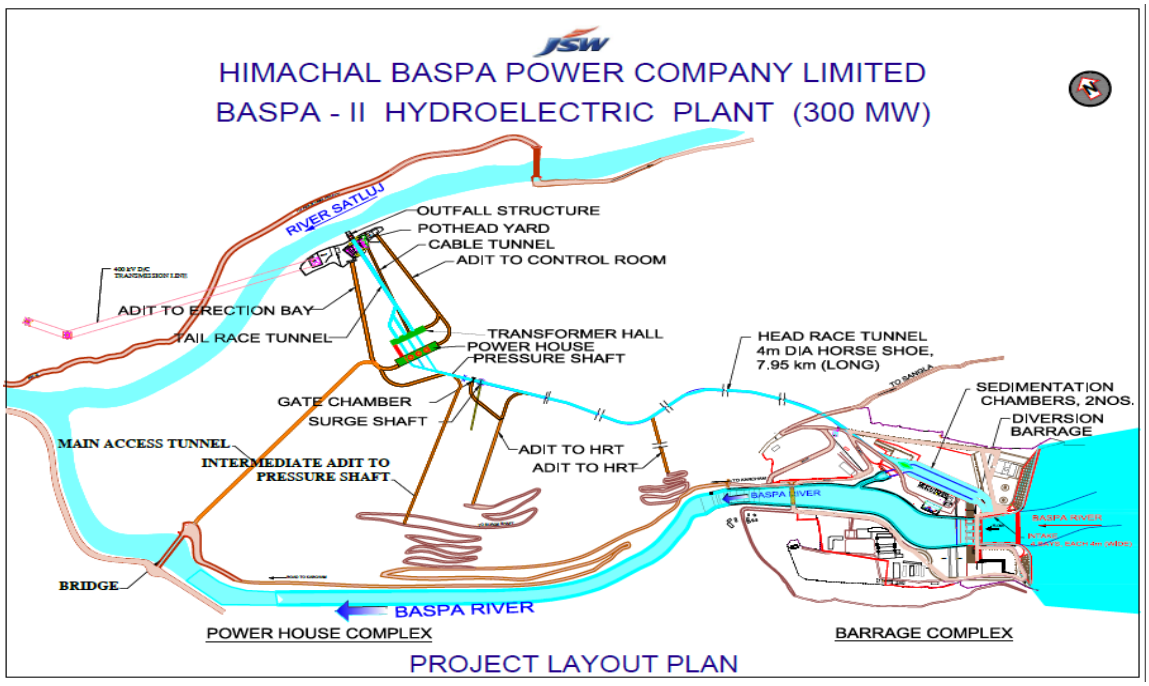
Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The 1st unit of the 300 MW run-of-river hydro power project of installed capacity 100 MW got commissioned on 24-May-2003, the second unit on 29-May-2003 and third unit on 08-June-2003 that corresponds to the date when the project got fully commissioned. The project, being a run-of-river type Hydro-Power project, would generate power by utilizing the water diverted from the flow of river Baspa. The flow in the river Baspa is contributed by several nullahs and khuds and numerous glaciers. The diversion barrage of the project is located across river Baspa, one of the major tributaries of river Satluj, at Kuppa in Himachal Pradesh. Water is diverted from the barrage to the power house through a diversion barrage. Two open sedimentation chambers are used after the diversion barrage to exclude the silt from water used for power generation. The

water is passed through a head race tunnel of about 7.95 km long and steel lined pressure shaft (about 885 meters long to create a design head of 702 meters) which is branching into three penstocks for running 3 pelton turbines of 100 MW each. A surge shaft has been constructed between the head race tunnel and the pressure shaft which would be used to regulate the flow.



The power generated is stepped from 33KV up to 400 KV and is evacuated by two circuits of 400 KV lines for the power station to Jhakri substation, which is about 55 Km from the site. The transmission line from the power station to Jhakri consisting of 121 towers has been installed as a part of the project. From Jhakri, 400 KV transmission system is utilized to evacuate the full output of (300 MW) hydroelectric project.

Technical information of the Project activity

Parameters	Specifications
HYDROLOGY	
Catchment area at barrage axis	967.72 sq.km
Snow catchment	514.15 sq.km
Design flood (1 in 100 Years)	1150 Cumec
Minimum discharge for 90%	9.4 Cumec
DIVERSION BARRAGE	
Type	Gated, 61 m long
Length of Barrage	70 m (4 bays of 13m each, 3 Piers of 3m each
Height of Barrage from deepest foundation	21.15 m (EL. 2533.50 to EL. 2512.35m at 40m D/S of B/Axis)
Maximum Pond Level	EL. 2531.50m
Minimum Pond Level	EL. 2527.50m

Live Storage at FRL	75.00 Ha-m
Average River bed level at barrage site	EL. 2519.00m
INTAKE	
Crest Level	EL. 2525.00m
No. of intake bays	4 bays each 4 m wide (Plus 2 bays for Baspa Stage-I)
Discharge through intake	65 cumec
SEDIMENTATION CHAMBER AND FLUSHING DUCTS	
Particle Size to be Excluded	(+) 0.2 mm
Flow through velocity	0.3 m/s
Desilting tanks	2 Nos.
Size of tank	138.5m (L) x17m (W) x16m (H)
Flushing discharge	13 cumec
Size of Flushing tunnel	0.84mx1.8m (H) (2 Nos.)
Head Race Tunnel (HRT)	
Length	7950 m (excluding 103m of cut and cover portion)
Type of Section	4m dia, Modified Horse Shoe
Design Discharge	52 cumec
Slope in tunnel	1 in 114
Lining	Concrete lining
SURGE SHAFT	
Type	Underground
Diameter	6m/8m
Height	121m
PRESSURE SHAFT	
No. & Type	One number, steel lined 3.1 m dia 885m long with two bifurcations U/S of Power House
Unit Penstock	3 Nos, 1800 mm dia
Power House	
Capacity	3 x 100 MW
Type	Underground
Size of P.H. Cavern	92 m (L) x 18m (W) x 39 m (H)
Size of T.H. Cavern	75 m (L) x 13m (W) x 20 m (H)
GENERATION	
In 90% dependable year	1213 MU per annum
In 50% dependable year	1391.61 MU per annum
Tail Race Tunnel (TRT)	
Length and Shape	250m long, 5.6m d-shaped

Hydraulic Turbines (HYDRO-VEVEY, SWITZERLAND)	
Type	Pelton
Design Head	702 m
Rated Output	103 MW
Normal Speed	375 rpm
No. of Jets	4
Generators (SIEMENS A.G., GERMANY)	
Rated Output	111MVA with 10% overload margin with higher temperature rise
Rated Voltage	13.8 kV +/- 5%
Frequency	50 Hz +/- 3%
Synchronous speed	375 rpm
MAIN UNIT TRANSFORMERS (BHEL)	
No. & Capacity	3x41 MVA, Single Phase
BUS DUCTS (SIEMENS A.G., GERMANY)	
Type	Isolated phase, Continuous type
Rated Voltage	15 kV
Rated Current	6000 A (Main) / 4000A (Delta)
Cooling	Natural
E.O.T. CRANES (WMI CRANES LTD.)	
No. & Capacity	1x 210/25/10 tonne
Span	18.8 m
55 Km long, 400kV D/C Transmission Line between Baspa-II to Jhakri - Total scope including Benching work, Foundation work, Tower Erection Work, Stringing Work and Revetment Work at 121 Locations involving crossing of the valley 13 times	

During the current monitoring period, the hydro power project was operating with normal operational schedule including scheduled shut down for maintenance mentioned in Appendix 2. During the current monitoring period 01-August-2021 to 31-July-2022, the project activity achieved 1,276,829 tCO_2e as a result of supplying 1,376,932.94 MWh clean electricity to grid.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

The following deviation is included in Monitoring period 01-January-2018 to 31-October-2020 and considered in subsequent verifications:

Deviation 1:

Since 01-September-2015, project activity ownership rests on the Himachal Baspa Power Company Ltd. The company name changed to JSW Hydro Energy Limited from 01-September-2018. The relevant document for change in company name and corresponding change in communication agreement to VCS has been provided. The project ownership and project name

change deviation has been approved in Verification report (Monitoring duration 01-November-2020 to 31-July-2021)[10].

Timelines:

1st Crediting Period: 01-April-2006 to 31-March-2016 (inclusive of both days)

2nd Crediting Period: 01-April-2016 to 31-March-2026 (inclusive of both days)

Verification Number	Monitoring Period Dates (inclusive of both mentioned days)
First Verification of Second Crediting Period	01-September-2015 to 31-March-2016 (Under First Crediting Period)[11]
	01-April-2016 to 31-December-2012 (Under Second Crediting Period)
Second Verification of Second Crediting Period	01-January-2018 to 31-October-2020[12]
Third Verification of Second Crediting Period	01-November-2020 to 31-July-2021[13]
Fourth Verification of Second Crediting Period (Current Monitoring Period)	01-August-2021 to 31-July 2022 (Current Monitoring Period)

The following deviations are included in current verifications (Monitoring Period: 01-August-2021 to 31-July 2022):

Deviation 2:

The Longitude (E) and Latitude (N) of the location of the Baspa powerhouse has been updated in the monitoring report to ensure more accurate detection. The deviation doesn't impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario. The coordinates for the power house of the Baspa project have been revised and are now recorded as.
Longitude (E) : 78°11'23''
Latitude (N) : 31°29'48''

The nature of deviation is permanent.

Deviation 3:

A typo error was identified in the Joint PD MR having monitoring date (01-September-2015 to 31-December 2017)[11] regarding start date of project activity. The reports mention 08-June-2003 but the unit-I commissioned in 24-May-2003. The correct date is mentioned correctly in every

[10] https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=68049&IDKEY=2kjalskjf098234kj28098sfkjlf098098kl32lasjdflkj909293839571 section 3.3 page 14

[11] https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=64497&IDKEY=L0e98hfalksuf098fnsdalfkjfoijmn4309JLKJFjlaksjfla9088941363

[12] https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=64503&IDKEY=flksjoiuwqowrnoiuomnckjashoufifmln902309ksdflku098n88949637

[13] https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=68048&IDKEY=k98klasmf8jflkasf8098afnasfkj98f0a9sfsakjflsakjf8df93838192

monitoring previous and after the crediting period. The deviation doesn't impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario. The nature of deviation is permanent.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameter Available at Validation

Data / Parameter	$EF_{Grid, CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin Grid emission factor for the project activity
Source of data	Calculated from CEA database, Version 12, May 2017[14]
Value applied	0.9273
Justification of choice of data or description of measurement methods and procedures applied	The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 12.0, published by the Central Electricity Authority, Ministry of Power, Government of India. 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 CO_2 emission factor in year y (tCO_j/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 25% W_{BM} = Weighting of build margin emissions factor (%) = 75% The above weighing is as per "Tool to calculate the emission factor for an electricity system", version 06.0.0 for other projects (hydro in this case) and for second crediting period
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed and it is same for the entire crediting period

[14] https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver12.pdf

4.2 Data and Parameters Monitored

<table>
<tr><td>Data / Parameter</td><td>$EG_{PJ,y}$ / $EG_{facility,y}$</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Net Electricity supplied to the grid by the project activity during the year y</td></tr>
<tr><td>Source of data</td><td>Joint Meter Reading (JMR) by SEB (State Electricity Board)</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>For the measurement of net energy delivered to the grid, two transmission lines are provided. Each transmission line has a set of main meter and check meter have been installed at the power house of project activity.

The meters are capable of metering export and import data separately. The net electricity delivered to the grid would be the difference of export and import energy.

The JMR Readings form the basis for calculation of the emission reductions. The JMR Readings are taken at the power house of the project activity in the presence of HPSEB (State Electricity Board) officials and the PP representative.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuous monitoring and monthly recording</td></tr>
<tr><td>Value monitored</td><td><table><tr><td>Year</td><td>Net Electricity Supplied to grid (MWh)</td></tr><tr><td>2021</td><td>639,685.94</td></tr><tr><td>2022</td><td>737,247.00</td></tr><tr><td>Total</td><td>1,376,932.94</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>Two sets of meters (main & check meters) are used for measuring the electricity export to the grid and electricity import from the grid. The details of meters and calibration details are provided in APPENDIX 1.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The meters are calibrated once in every 5 years[15]; and faulty meters will be duly replaced immediately. The meter accuracy class and calibration interval is under purview of state electricity board and PP do not have any control on it. It is also noted that monitoring procedure is under control of state electricity board.</td></tr>
</table>

[15] https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

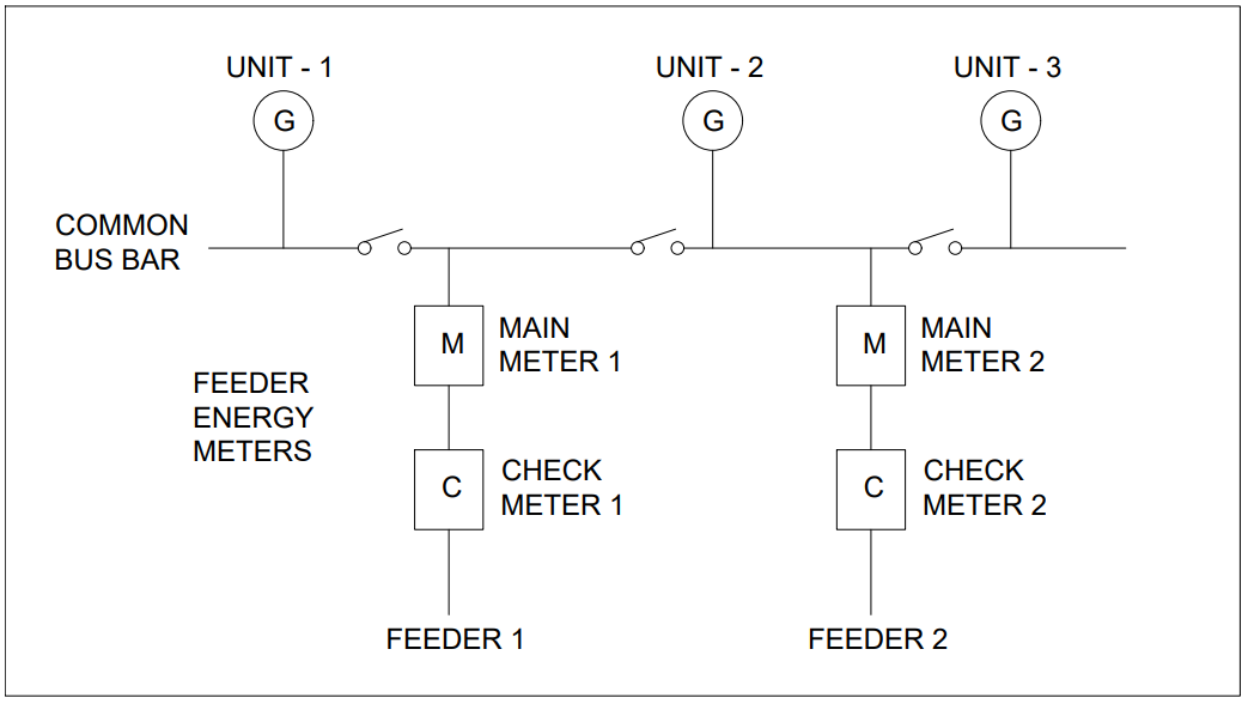
	The net electricity export value is also cross checked with electricity sales invoices.
Purpose of the data	Calculation of baseline emissions
Calculation method	Net Energy Generation = Total electricity generation – 0.65% of Total electricity generation
Comments	-

4.3 Monitoring Plan

An internal audit carried out every year to ensure that the monitoring parameters are being monitored on sampling basis in accordance with Section 4.2 of monitoring report.

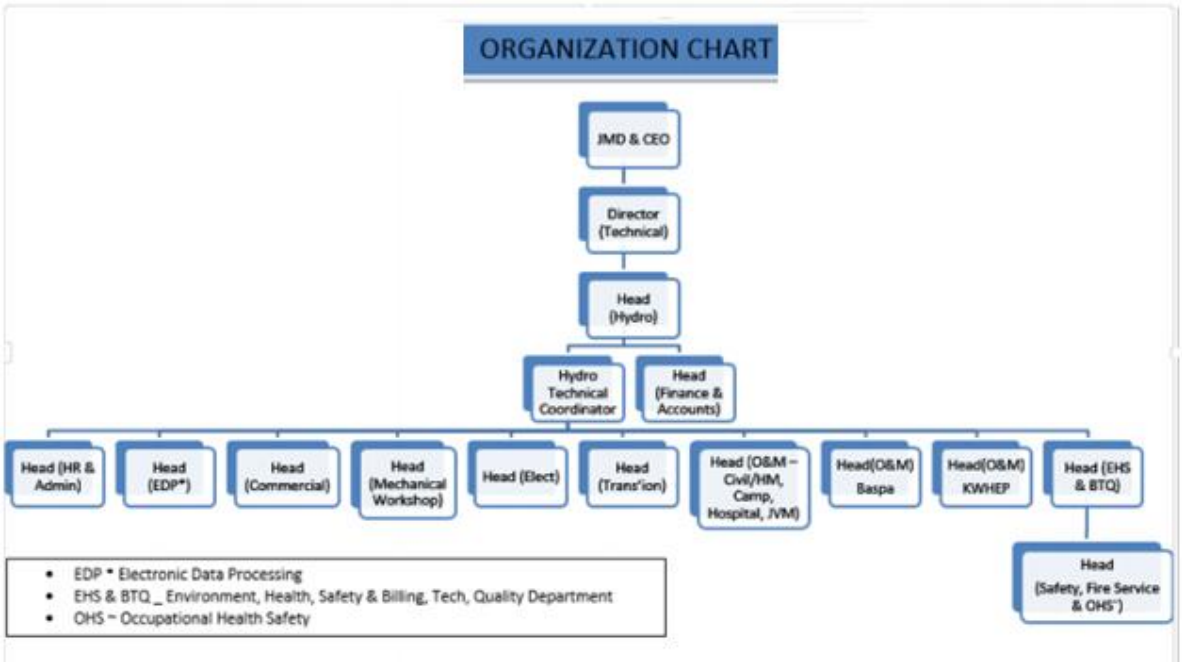
A project team is constituted with participation from relevant departments at the site. It is comprising of personnel at the Kuppa barrage, and the Sholtu office. This team is responsible for data collection and archiving. They meet periodically to review the project activity, and check the data collected, etc. The Kuppa office is responsible for barrage control and the operation and maintenance of hydro mechanical equipment. The Sholtu office looks into the general administration along with the liaisoning with various government departments viz civil administration, horticulture etc. and is overall in-charge of the Baspa plant along with the barrage, transmission lines and co-ordination with HPSEB (Himachal Pradesh State Electricity Board). At the project site, the JMR of commercial metering at inter-connection point is jointly recorded by the representatives of PP and HPSEB (Himachal Pradesh State Electricity Board) every month. To account the transmission loss between project site and Jhakri sub- station, the net electricity supplied to grid measured at project site has been deducted at 0.65%. This is as per state electricity board regulations. For a clear and concise overview of a power system's components and their interconnections a single line diagram has been provided.

All the metering points of the project activity are shown in the schematic line diagram below:



The JMR reports are checked and discussed by the senior team members/managers periodically. In case of any irregularity observed by any of the team member, it is informed to the concerned person for necessary actions. The project site also has a digital system SCADA for the overall monitoring of the project.

The management structure is as given in the diagram below:



Data Monitoring:

The methodology requires monitoring of the following:

- Net Electricity generation from the project activity;

All the main meters and check meters are tested by PGCIL (Power Grid Corporation of India Limited) on a periodic basis. In case of any faulty readings observed appropriate corrective action will be taken. If the error is found beyond the permissible limits, the PP will inform the respective agency so as to immediately rectify the error in the instrument.

Metering System

The project activity comprises of two transmission lines for energy exported to the grid. Each transmission line has a main meter and a check meter, which are calibrated once in 5 years as per CEA notification[16]. Although the selected calibration frequency is once every five years, PP follows the good practice of replacing meters annually. These are tri-vector meters of Secure make with digital display and are of 0.2s accuracy class. There is a separate import meter for the 22kV line which is used to supply power to the Sholtu site. This meter is under the purview of HPSEB (Himachal Pradesh State Electricity Board) and is maintained by them.

Completeness and Reliability:

The project activity has installed the latest state-of-art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Real time data monitoring by SCADA takes place using these control system. All the monitoring equipments undergo the process of regular meter testing and calibration as under Section 4.2. The JMRs for the power exported from the project activity and the HPSEB (Himachal Pradesh State Electricity Board) bills/ invoices of the 22 kV line are used to validate the data accuracy.

Frequency:

The frequency is as explained in data and parameters monitored.

QA/QC of monitored data:

The monitoring procedure is under control of state electricity board. The meters are calibrated once in every 5 years and faulty meters will be duly replaced immediately. The meter accuracy class and calibration interval are under purview of state electricity board and PP do not have any control on it. The net electricity export value is also cross checked with electricity sales invoices. All data will be kept for a minimum of 2 years following issuance of certified emission reductions or the end of the crediting period, whichever is later, and the storage of this data will be the responsibility of the project owner.

Emergency preparedness:

In case Main meter or check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it is being repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or calibration, the check meter is being used. In case both the main and check meter are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, both the meters

[16] https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

shall be calibrated immediately and the error percentage found in the main mater during its calibration shall be applied to its metered energy data for the entire period since its last calibration to obtain the corrected value of net electricity exported to the grid. However, no such case has been observed.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions are calculated by multiplying the Net electricity exported to the grid with net baseline emission factor.

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

Where,

BE_y = Baseline Emissions (tCO_2/year)

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

$EF_{grid, CM, y}$ = Baseline Emission Factor (Combined margin CO_2 emission factor for grid)

The project activity being a greenfield project, $EG_{PJ, y} = EG_{facility,y}$= Net electricity exported to grid by the project activity (MWh/year)

The calculation of yearly baseline emissions is provided in the table below:

Year	Net Electricity Export (MWh)	Baseline Emission Factor (tCO2e/MWh)	Baseline Emissions (tCO_{2e})
01-August-2021 to 31-December-2021	639,685.94	0.9273	5,93,180
01-January-2022 to 31-July-2022	737,247.00	0.9273	6,83,649
Total	1,376,932.94	-	1,276,829

Hence the baseline emission calculated for the reported monitoring period i.e.BE_y= 1,276,829 tCO_2e

5.2 Project Emissions

PE_y= Project emission due the project activity in a year

For most renewable energy power generation project activities, PE_y = 0.

As per para 38 of ACM0002 Version 17.0, for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected.

The project emission includes the CH4 emission from the reservoir. Since the project activity is a run-of-the-river project with a reservoir facility for diurnal storage, the calculation for project emissions as per the methodology is as follows:

Parameters	Unit of Measurement	Value
Capacity	MW	300
Running Hours	Hours	24
Reservoir area	Ha	33

$PD= (Cap_{PJ} – Cap_{BL}) / (A_{PJ} - A_{BL})$

PD = Power density of the project activity, in W/m2

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W).

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W).

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2)

A_{BL} = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero

Since the reservoir is a newly installed facility and does not result in the increase of existing reservoir, and Cap_{BL} and A_{BL} can be assumed to be zero. The reservoir area is 33 ha (FSL).

Thus,

$PD = Cap_{PJ}/ A_{PJ}= (300*1000*1000)/ (33*10000) = 909 W/m^2$

As per the methodology AM0002 V17 para 43(c), if the power density (PD) of the power plant is greater than 10 W/m^2, then the project emission are zero.

Hence the Project Emission are PE_y =0 tCO_2e

5.3 Leakage

According to ACM0002 version 17.0, leakage emissions are nil. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use(e.g. extraction, processing, transport etc.) are neglected.

$LE_y = 0\ tCO_2e$

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity is

$ER_y = BE_y - PE_y - LE_y$

Where,

ER_y = Emission Reduction in tCO_2/year
BE_y = Baseline emission in tCO_2/year
PE_y = Project emissions in tCO_2/year
LE_y = Leakage Emissions in tCO_2/year

For the project activity during the current monitoring period, as per section 5.1, 5.2 and 5.3

$BE_y = 1276{,}829\ tCO_2e$

$PE_y = 0\ tCO_2e$
$LE_y = 0\ tCO_2e$

$ER_{y=}1276{,}829\text{-}0\text{-}0$

$=1276{,}829\ tCO_2e$

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-August-2021 to 31-December-2021	5,93,180	0	0	5,93,180
01-January-2022 to 31-July-2022	6,83,649	0	0	6,83,649
Total	1,276,829	-	-	1,276,829

The actual VCU is about 5.32% higher than the estimated VCUs. The amount of electricity generated is dependent on the volume of water flowing through the plant, with variations in water availability potentially affecting the plant's output. Factors such as drought or altered precipitation patterns may influence the water supply and subsequently impact the electricity production of the hydroelectric facility. This variation is majorly due to the variations in water flow

which is mainly dependent on rainfall which leads to variation in PLF and with other parameters including grid availability – these factors are not in the control of project proponent. There are no any design changes for the project activity and increase is due to high production only.
From 01-01-2018 to 31-July-2022 the yearly PLF has been observed as 47.90%, 51.57%, 49.82%, 48.78%, and 48.30% respectively. As the PLF's from the last four year are not on the higher side when summarized with previous verifications. There is no any impact on additionality due to higher production as additionality is demonstrated based on "barrier due to prevailing practice".

APPENDIX 1: METER CALIBRATION DETAILS

There are four (4) meters in the project activity in two sets – two main meters and remaining two are check meters. Although the selected calibration frequency is once every five years, PP follows the good practice of replacing meters annually. The details of meters along with operation schedule are given below:

Date of Meter Installation→		10-November-2020	21-October-2021[17]	20-November-2021	11-November-2022
Feeder 1	Main Meter (Main-1)	HPU 06213	Q0333490	Q0333309	HPU13630
	Check Meter (Check-1)	HPU 06214	Q0333301	Q0333448	HPU13631
Feeder 2	Main Meter (Main-2)	HPU 06215	Q0333441	Q0333368	HPU13632
	Check Meter (Check-2)	HPU06216	Q0333379	Q0333403	HPU13633

Details of meters (all)-

Make: SECURE

Accuracy class: 0.2s

Meter calibration details:

Serial No.	Meter Type	Date of calibration	Validity till
HPU 06213	E3M024	20-December-2016	19-December-2021
HPU06214	E3M024	20-December-2016	19-December-2021
HPU06215	E3M024	20-December-2016	19-December-2021
HPU06216	E3M024	20-December-2016	19-December-2021
Q0333309	APEX150	17-November-2021	16-November-2026
Q0333448	APEX150	17-November-2021	16-November-2026
Q0333368	APEX150	18-November-2021	17-November-2026
Q0333403	APEX150	18-November-2021	17-November-2026

Considering calibration frequency of once in five years[18], there have not been any delay in calibration of the meters.

[17] As per the Annex E (Clause 12.2.2.1) of the *RECOMMENDED SAMPLING PLAN*, A random selection of meters from the lot are taken to perform tests to detect any errors. These tests include evaluations under no load conditions and assessments for repeatability of errors. As a result, meters are replaced at frequent intervals.

[18] https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

APPENDIX 2: BREAKDOWN DETAILS:

Breakdown Summary from August-2021 to July-2022:

Month	No. of Tripping/Stoppages	Remarks	Total Duration (Hrs:Min)
FY 2021-22			
August -2021	1	Unit# 2 under forced shutdown due to moisture ingression in Deflector-3 from 13:00 Hrs of 06.08.2021 to 16:00 Hrs of 06.08.2021.	03:00
Total			03:00
FY 2022-23			
July-2022	1	Unit-2 under forced outage due to Rotor Earth Fault from 20:00 hrs. to 22:45 hrs. of 21.07.2022.	02:45
	2	Unit-2 under Planed outage due to Leakage from MIV Air release Valve from 02:00 hrs. to 03:55 hrs. of 28.07.2022.	01:55
Total			07:40

Plant Breakdown has occurred during the current monitoring period, total breakdown duration is calculated as 7 hours 40 minutes. No significant impacts have occurred due to plant breakdown on the GHG emission reduction from the project activity and monitoring process of the project activity.