ALLAIN DUHANGAN HYDROELECTRICPROJECT (ADHP)

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

Project Profile:

Allain Duhangan Hydroelectric Project (ADHP) by AD Hydro Power Ltd. (ADPL) is a run-of the-river 192 MW hydro power project at the confluence of Allain & Duhangan rivulets at Pirni village in Manali town of Kullu district in Himachal Pradesh state of India. This is a new hydroelectric project, currently with a reservoir having a power density of 6508.4746 W/m^2. The project consists of high head underground power plant that would utilise flows from a combination of glacial snow melt and monsoon rains in these two rivulets for the purpose of harnessing hydro power.

ADPL intends to function as a merchant power plant with short term Power Purchase Agreements (PPA) of 1-3 years duration. The power generated at the project would be fed Indian Grid. A 220 kV power transmission line (of approximately 185km length) is constructed to evacuate power from the project, to an existing substation at Nalagarh, from where it is being fed to the Indian Grid.

Construction work at project site has been started and the project activity is expected to start generation of power from June 2008. The project energy benefits have been assessed at (Central Electricity Authority CEA approved) 678.18 GWh year in 90% dependable years. The project activity has a power density factor of 6508 W/M^2.

Project Purpose:

The purpose of the project activity is to generate electricity using renewable hydro energy and supply it to various consumers through Indian grid. In the Indian grid more than 70% of the power supplied is generated using fossil fuels (coal, Diesel, Gas etc). And as the project activity is a renewable energy based power project, it reduces anthropogenic Green House Gases (GHG) emissions that would have been generated to supply power to Indian grid using fossil fuel. The project activity shall also contribute to sustainable development[1] in following manner:

- Sustainable development through utilization of renewable hydro resources available in the project region.
- Catering to power demand in Northern India by augmenting power supply in the Indian Grid.
- Conservation of natural resources (like coal, gas, petroleum fuels etc.) through use of renewable source of energy.
- Adhering & contributing to India's national policy of promoting clean power.
- Providing Employment opportunities[2] to local community during plant construction and operations.
- Development of infrastructure in the region.

[1] Sustainable development aspects are discussed in annex-5

[2] 2000 people during plant construction and 100 people during plant operations

Implementation of the project activity would catalyse implementation of other similar hydro power projects in India by private players.
During the current monitoring period 15,35,217 tCO_2e generated.

1.2 Sectoral Scope and Project Type

The project activity falls under

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

Project Type : Renewable Energy Projects

Title : Consolidated baseline methodology for grid-connected electricity generation from renewable sources[3]

Reference : Approved consolidated baseline and monitoring methodology ACM0002, Version 06

This project is not a grouped project activity.

1.3 Project Proponent

Organization name	AD Hydro Power Limited
Contact person	Mr. O.P. Ajmera
Title	Vice President- Finance
Address	Street/P.O.Box: Sector-1, Building: Bhilwara Towers, A-12, Noida, Uttar Pradesh, India ZIP: 201301
Telephone	+91-120-2541810
Email	opajmera@lnjbhilwara.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Anjali
Title	Project Manager
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar INDORE – 452010, India.
Telephone	-
Email	anjali@enkingint.org

[3] http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L/view.html

1.5 Project Start Date

The commercial production of the project activity started on 17/07/2010 with the commissioning of first unit, Unit II of 96MW. Another unit, Unit I was commissioned on 16/09/2010. Evacuation of power from the project plant started from 17/07/2010 using 132 kV transmission line via Bajaura substation which continued till 04/09/2010. The COD of Unit II of the run of river hydro power project is 18/09/2010.

So, the start date for the project activity is 16/09/2010, which is the earliest date of commissioning of Unit I of the run of-river hydro power project activity.

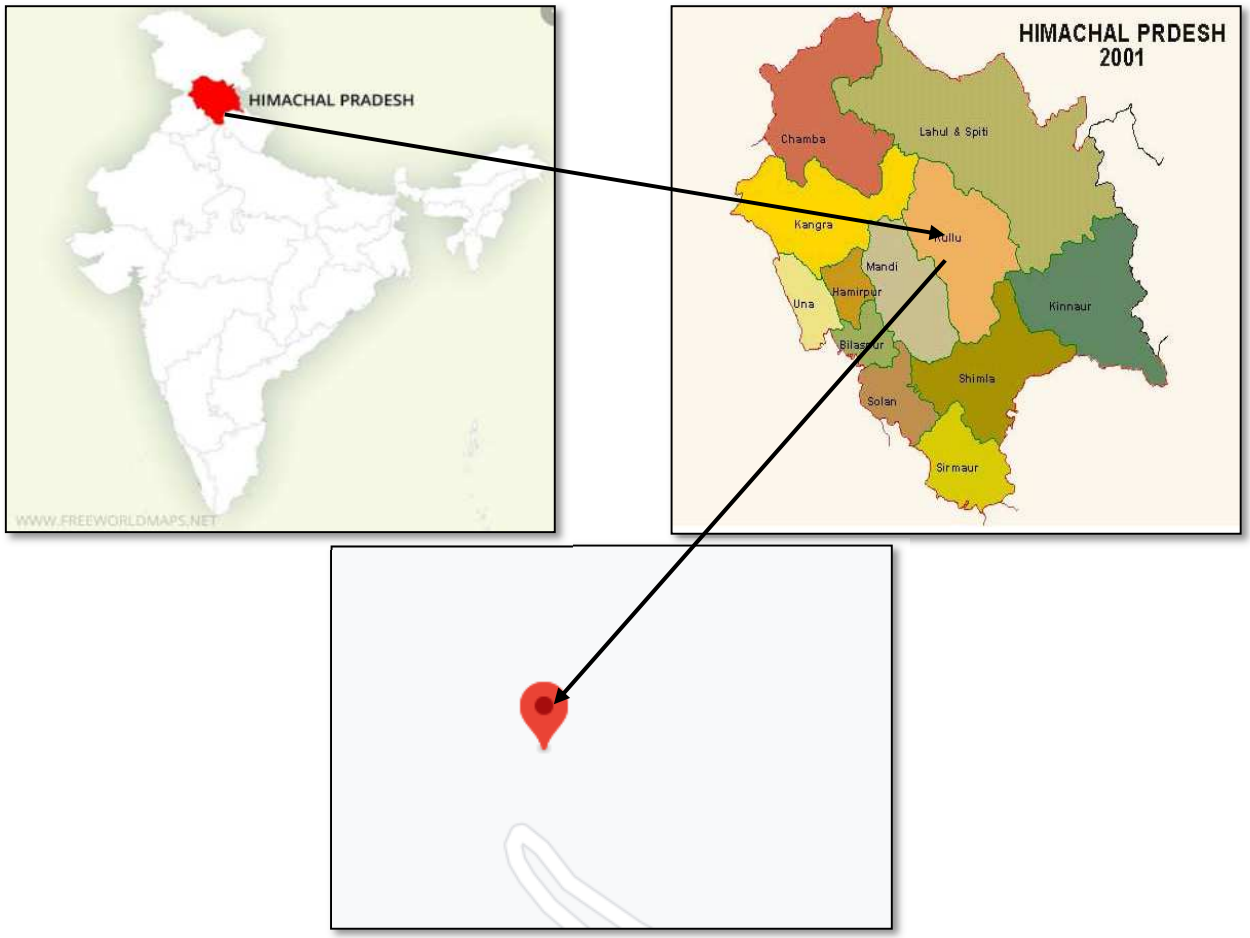
1.6 Project Crediting Period

The crediting period of the project activity is for 10 years (fixed). The length of crediting period is from 16/09/2010 – 31/05/2020[4].

1.7 Project Location

The project is located in Pirni village near Manali Town in the District of Kullu of Himachal Pradesh. The project site is located about 60 Kms from Bhuntar airport and 50 Kms. from the town of Kullu. Both these towns are located along the National Highway-21. Bhuntar is 500 Kms from national capital Delhi by road. The physical location of the project activity is shown in the following figure.

[4] The start date of Crediting period is according to VCS i.e. earliest COD of the project however the end date is same as of the of registered CDM project 0862 and will abide to it.



State, District, Tehsil	Pirni, Manali, Kullu, Himachal Pradesh, India
Longitude	32° 13'36" N
Latitude	77° 12' 35" E
Nearest rail head	Joginder Nagar
Nearest Airport	Kullu Manali Airport
Nearest National Highway	NH - 21

1.8 Title and Reference of Methodology

Methodology Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".
Reference: ACM0002, Version 06, Sectoral Scope: 1[5]

The methodology has been referred from the list of approved methodologies for CDM project activities in the UNFCCC website

[5] https://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

Methodological Tool: This methodology also draws upon of the Tool for demonstration and assessment of additionality Version 01[6]

1.9 Participation under other GHG Programs

The PP has participated under CDM mechanism of UNFCCC. The UN reference id 0862[7] of program with this project activity. The PP would not consider the credit from any other mechanism for the current monitoring plan. The undertaking is provided to confirm that there is no any double accounting for current monitoring period.

1.10 Other Forms of Credit

Include the following information, as applicable:

- Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.
- Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits.

1.11 Sustainable Development

Contribution to sustainable development:

Ministry of Environment, Forest and Climate Change, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity also help to reduce the demand supply gap in the state. The project activity generates power using zero emissions Wind based power generation which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.

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

[7] https://cdm.unfccc.int/Projects/DB/DNV-CUK1169040011.34/view

- **Technological well-being:** The successful operation of project activity would lead to promotion of Wind based power generation and would encourage other entrepreneurs to participate in similar projects
- **Environmental well-being:** The project activity being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the project activity also helps in avoiding significant amount of GHG emissions.

2 SAFEGUARDS

2.1 No Net Harm

The project does not involve any potential negative environmental and socio economic impacts and hence this criteria is not applicable to this project activity.

Please refer to section F.1 and F.2 of the PDD of UNFCCC registered CDM project with Ref No: 0862. The web link for the same is given below:

https://cdm.unfccc.int/Projects/DB/DNV-CUK1169040011.34/view.

2.2 Local Stakeholder Consultation

The project activity is a large scale hydro power project. Due to size of the project activity it has drawn attention of a large section from stakeholders. But as it is a run-of-river project there is no substantial displacement of people. However, considering it as social responsibility project proponents have undergone a social impact survey with the help of professional experts and consulted with different sections of stakeholders and invited them to provide their opinion on the project activity.

SIA was based on a variety of information collected from primary as well as secondary sources.

Primary Information:

The primary information was collected through visits to the affected villages for meetings with the Gram Panchayat, household survey, consultations with villagers and focused group discussions with women and below poverty line (BPL) persons. At each village a pre-determined set of information was collected.

At the Gram Panchayat level following information was sought to be extracted through discussion.

Demographic profile

- Average land holding and asset ownership pattern, income levels, occupation
- Accessibility and linkages
- Key development issues
- Opinion on the project activity

The Sarpanch (Village Chief) was present in the meetings.

Consultations with villagers and focussed groups were also designed to seek the following information:

Socio-economic Impacts

- Loss of income, livelihood
- Access to fuel wood
- Job prospects
- Development of the area
- Influx of additional people in the area
- Opportunity for infrastructure development through the project
- Opportunities for social and economic development of the area

Public Health

- Common diseases
- Access to health facilities
- Any epidemic/ outbreak

Religious/ Archaeological

- Religious sites in the vicinity
- Archaeological sites
- Access/ influence

Gender

- Role and status of women in the community
- Division of labour within the households
- Potential impact on the women

At the household level also information were sought out about social classification, family details at individual level, project impacts, loss of common property resources etc.

Secondary Information:

The secondary sources of information included various documents published by the government of Himachal Pradesh such as district census handbook, statistical abstract, economic survey report and relevant laws/acts and policies. The National Thermal Power Corporation (NTPC)'s scheme for rehabilitation and resettlement of the Kol Dam project was also referred since it was accepted by the Himanchal Pradesh (HP) government as a benchmark for projects undertaken by other agencies. Unpublished material included land records at the Patwari's office and land use records at the District Collector's office. Field visits included visit to office of the Sub Divisional Magistrate (SDM) and Block Development Officer (BDO) to know about the development initiatives being planned for the area, to Patwari's office to understand procedure of land transfers, land acquisition and procure for calculating the land prices. Visit to state capital Shimla included meetings with horticulture department to understand the procedure for valuation of apple trees, cropping pattern across the Tehsil/ district and maximum/ minimum yield. Meetings with Tribal development department were held for understanding special

provisions for Schedule Tribe in project area.

Please refer to section E.1 and E.2 of the PDD of UNFCCC registered CDM project with Ref No: 0862. The web link for the same is given below.
https://cdm.unfccc.int/Projects/DB/DNV-CUK1169040011.34/view

2.3 AFOLU-Specific Safeguards

This section is not applicable here as the project activity is a non-AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Allain Duhangan HEP is a run of the river project envisaging generation of 192 MW power by utilising the flows in Allain and Duhangan streams. It has been noted that the river flow in these streams varies significantly between 3.5 cumecs and 30 cumecs during high flow and lean flow seasons.

Due to snowmelt, the river flow in these streams varies hourly with a generally higher discharge during evening/night time. Water stored during the lean season at night can thus be utilised for peak power generation in the early morning when the discharge is at its lowest. The ADHP is designed to provide a peak power generation of 4 hours each day during lean season.

During high flow season, the power plant generates on continuous basis and no storage is required. For a 4 hour peaking generation, ADHP requires 302,400 cum storage based on an installed flow capacity of 25.3 cumecs and minimum average combined river flow of 4.3 cumecs. The total storage capacity available at ADHP is 302,400 cum comprising of:

- Storage at barrage with 41 800 cum between El 2752m and 2745m;
- Storage at desander with 23 000 cum between El 2752m and 2744m;
- Underground storage in Allain and Duhangan headrace tunnels of 25 000 cum and 7 000 cum respectively between El 2752m and 2734m;
- Storage at intermediate reservoir with 205 600 cum between El 2748m and 2734m.

The barrage is designed to pass a flood discharge of 760 cumecs corresponding to 100 years return period. The spillway crest is at El 2745m which allows the passage of full flood discharge at water El 2752m. During monsoon period the spillway gates remains fully opened to avoid sedimentation occurring in the barrage reservoir.
The water level in the desander is controlled by the downstream sill with crest El 2744m. To ensure good operation of desander during monsoon, the maximum water level is fixed at El 2744.3 m. During monsoon period, the intermediate reservoir operates at maximum water level of 2742m.
During non-monsoon period, the operating water level varies between 2752 and 2738 m. The arrage and sluice gates remains closed and head regulator gates remains fully opened and any

excess flow is released through the overflow structures located in the intermediate reservoir. Due to this storage, the full reservoir level is kept identical to the high flood level corresponding to 100 year return period flood. Thus no additional submergence is envisaged due to non-monsoon peaking storage.

The operation rules for the peaking storage reservoir operation depend on both the seasons during the year and on daily flow variations. The following operation rules are adopted for run of the river type ADHP project:

- Priority for Peaking Energy - The reservoir water level is kept at the maximum level possible in order to generate the maximum energy during the peaking hours: for ADHP during the non-monsoon seasons, the maximum water level – El 2752m; during monsoon season, the maximum water level for barrage is fixed at El 2745 m and the intermediate reservoir operation was fixed as El. 2742.0 m;
- During the flood season, the target water level in the intermediate reservoir is fixed at El. 2 742.0 m. This permit storing a small quantity of the excess flow in the river during lean season;
- The ecological discharge is deducted from the river flow.
- The spillway is fully opened when the combined river flow (Allain and Duhangan river flows) is greater than 13.5 m^3/s, normally between May and September and the water level is restricted to El 2745m.
- The spillway gates are full closed when the combined river flow is less than 3.5 m^3/s (Normally between October and April);
- When the combined river flow is less than 7.2 m^3/s, the storage of the barrage reservoir of 41 800 m^3 is needed for peaking generation. In this case the head regulator gates are closed.
- About one half hour after starting the peaking generation, one gate of the head regulator is opened to discharge about 5.8 m^3/s in two hours. After 2.5 hours, the barrage storage is emptied.
- It is assumed that two gates of the head regulator is heated: one for normal operation; and one as stand-by. The gates are operated from the powerhouse.

3.2 Deviations

2.3.1 Methodology Deviations

There is no request for deviation applied during this monitoring period.

2.3.2 Project Description Deviations

There is no deviation applied for the project descriptions.

3.3 Grouped Projects

This project activity is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EFy
Data unit	tCO_2e/MWh
Description	CO2 emission factor of the grid
Source of data	NREB/NRLDC/CEA
Value applied	0.737
Justification of choice of data or description of measurement methods and procedures applied	Calculated as weighted sum of OM and BM emission factors as per step in ACM0002.
Purpose of Data	Calculation of baseline emissions
Comments	Fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG_y
Data unit	MWh
Description	Electricity supplied to the grid by the project activity
Source of data	ADHP records (switch yard logbooks) at site
Description of measurement methods and procedures to be applied	For measuring the energy delivered by the project activity at the interconnection point, one set of Main meter (part of interconnection facility) and check meter has provided by the company and the HPSEB at the interconnection point. Monthly joint meter readings of the main meter and check meter at the interconnection point has been taken by the designated officials of the company and HPSEB. The joint meter readings has been recorded and signed by the authorized representative of both the parties on each of the above instances.
Frequency of monitoring/recording	Continuous Metering, and monthly recording has been done
Value monitored	20,83,080.00
Monitoring equipment	Energy meters
QA/QC procedures to be applied	Meters installed at the switchyard accurately monitor electricity supplied to the grid.
Purpose of the data	Calculation of baseline emissions

Calculation method	Calculation of baseline emissions.
Comments	-

Data / Parameter	$FC_{diesel, y}$
Data unit	Tons
Description	Quantity of Diesel consumed by the standby DG set in year y
Source of data	Records of levels in the diesel storage tanks as per the plant log book.
Description of measurement methods and procedures to be applied	Measurement Procedure: The diesel quantity available in the diesel storage tanks is recorded daily by PP in the plant log book. The diesel consumption has been recorded in the logbook in litres. Accuracy of the Measurement Method: To confirm the accuracy on measurement of quantity of diesel consumed in the project activity can be cross checked against the fuel purchase receipts. Responsibility: Log book has been maintained by the shift in charge and same has been cross checked by the General Manager of the project activity.
Frequency of monitoring/recording	Frequency: Continuously monitored. Recording frequency: monthly and aggregated annually Archiving Policy: Paper & Electronic
Value monitored	3,912.98 Liters
Monitoring equipment	Manually Monitoring
QA/QC procedures to be applied	The data recorded can be cross checked against the fuel purchase receipts
Purpose of the data	Calculation of baseline emissions
Calculation method	It has been directly monitored. Thus, calculation is not necessary for this project.
Comments	-

4.3 Monitoring Plan

Data recording:

The methodology requires monitoring of electricity generation from the project activity.

Completeness:

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 collection is happening using these control systems. An hourly log of data is also prepared by the shift in-

charge. A daily report of aggregation of these data is also prepared. Parameters monitored are the total power generated, power exported to the grid and auxiliary power consumed[8] (other parameters like head availability, grid issues; frequency etc has also been maintained hourly in the log).

Reliability:

For electricity generation data, automatic control meters for power generation and export is regularly maintained. The plant operating & maintenance procedures also include regular meter calibration. Actual net power generation data is metered using switch yard energy meters. The billing invoices for the power sold and meters' readings at substation(s) are used to cross check the data.

Calculation:

$BE_y = EF_y * EG_y$

Where,

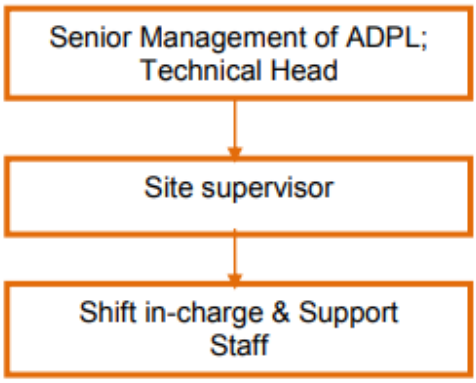
BE_y: Baseline emissions due to displacement of electricity during the year y in tons of CO_2
EG_y: Electricity supplied to the grid by the project activity during the year y in MWh, and
EF_y: CO_2 baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO_2/MWh.

Reporting: After verification of the data and due diligence on correctness, an annual report on monitoring and estimations is maintained by the CDM team and record to this effect is maintained for verification.

The electricity supplied to the grid by the project activity (EG_y) is being monitored at the switchyard as per the monitoring plan mentioned in the registered PDD. The value of the electricity supplied to the grid is directly arrived using the measured import and export readings from the respective energy meters. The data was measured by energy meters and log sheets were maintained by shift in charge on hourly basis. Further daily report of aggregation of generation data was prepared. Besides a manual log, data was captured directly from the meters through a digital data capture device on a weekly basis. The weekly reports were aggregated on a monthly basis and submitted to the management for review.The sales invoices were raised at different intervals depending on different contracts and copies are being archived for a cross checking during verification. The above mentioned reporting procedure is well in line with the monitoring plan mentioned in the registered PDD.

[8] The auxiliary power includes the power imported through 11 kV line from HPSEB (refer annex-3) when both the units of the project activity are not generating.

Organizational structure, roles and responsibilities



A CDM project team constituted with participation from relevant departments. People are trained on CDM concept and monitoring plan. This team is responsible for data collection and archiving. This team meets periodically to review CDM project activity check data collected, emissions reduced etc. On a weekly basis, the data monitoring report is checked and discussed by the seniors CDM team members/managers. In case of any irregularity observed by any of the CDM team member, it is informed to the concerned person for necessary actions. On monthly basis, these reports are forwarded at the management level.

Senior Management of ADPL/Technical Head: Overall responsibility of compliance with the CDM monitoring plan.

Site Supervisor: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation.

Shift In-charge: Responsibility of daily report generation.

Internal audits of CDM project compliance-

Internal Audit was conducted on 31/12/2016 by the owners' representatives to check the training of CDM team, correctness of monitoring procedures, reporting and archiving of data monitored. Report on internal audits done, deviation found and corrective action taken are maintained and kept for external auditing.

Emergency procedures-

In case of failure of main meter, the check meter readings shall be referred for emission reduction calculation. If both the main meter and check meter are failed simultaneously, the affected period shall not be considered for the emission reduction calculation.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are the product of electrical energy baseline EG_y expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.

BEy = EGy * EFy

Where:

BEy : Baseline Emissions in year y; t CO_2
$EG_{,y}$: Energy baseline in year y; kWh
EF_y : Emission Factor in year y; t CO_2e/kWh

As per registered CDM PDD, combined margin emission factor is 0.737 tCO_2/MWh. Hence the baseline emissions for the project activity for the current monitoring period are as follows.

$BE_y = EG_y * EF_y$ = 20,83,080 * 0.737 = 15,35,228 tCO_2e (rundown values)

5.2 Project Emissions

DG set on the site is used only as a back up to run the essential auxiliaries when both the units of power project are down and power from HPSEB is not available.

As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"[9]

Parameter	UoM	Value	Source
NCV of diesel	TJ/Gg	43.3	IPCC data, from 2006 guidelines, volume 2, Table
Density of diesel	kg/m^3	855	Diesel density @ 150C ,Euro IV / Bharat stage IV emission norms, Annex C foot note 5[10]
Emission factor of diesel	$KgCO_2$/TJ	74,800	IPCC data, from 2006 guidelines, volume 2, Table 1.4 (Upper value of

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

[10] http://www.iocl.com/Products/HSD_BS_IV_Specification.pdf

			emission factor at 95 % confidence interval)[11]
Oxidation factor of diesel	-	1	IPCC data, from 2006 guidelines chapter 1, Table 1.4[12]

Month	Quantity of Diesel Consumption (Litres)	Project emissions (tCO_2e)
01/10/2016-31/10/2016	137.41	0.38
01/11/2016-30/11/2016	206.72	0.57
01/12/2016-31/12/2016	204.29	0.57
01/01/2017-31/01/2017	353.85	0.98
01/02/2017-28/02/2017	200.64	0.56
01/03/2017-31/03/2017	85.12	0.24
01/04/2017-30/04/2017	72.96	0.20
01/05/2017-31/05/2017	58.37	0.16
01/06/2017-30/06/2017	38.90	0.11
01/07/2017-31/07/2017	72.96	0.20
01/08/2017-31/08/2017	42.56	0.12
01/09/2017-30/09/2017	48.64	0.13
01/10/2017-31/10/2017	63.23	0.18
01/11/2017-30/11/2017	58.37	0.16
01/12/2017-31/12/2017	85.12	0.24
01/01/2018-31/01-2018	52.29	0.14
01/02/2018-28/02/2018	64.00	0.18
01/03/2018-31/03/2018	240.75	0.67
01/04/2018-30/04/2018	46.21	0.13

[11] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

[12] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

01/05/2018-31/05/2018	31.62	0.09
01/06/2018-30/06/2018	34.05	0.09
01/07/2018-31/07/2018	30.40	0.08
01/08/2018-31/08/2018	31.62	0.09
01/09/2018-30/09/2018	30.40	0.08
01/10/2018-31/10/2018	37.69	0.10
01/11/2018-30/11/2018	38.91	0.11
01/12/2018-31/12/2018	218.88	0.61
01/01/2019-31/01/2019	734.46	2.03
01/02/2019-29/02/2019	204.28	0.57
01/03/2019-31/03/2019	111.87	0.31
01/04/2019-30/04/2019	21.88	0.06
01/05/2019-31/05/2019	24.32	0.07
01/06/2019-30/06/2019	30.40	0.08
01/07/2019-31/07/2019	38.91	0.11
01/08/2019-31/08/2019	113.08	0.31
01/09/2019-30/09/2019	47.82	0.13

PE_y = 11.0 tCO_2e (roundup values)

5.3 Leakage

No leakage emissions have been considered and hence the leakage emission is zero. So the emission reductions is equal to baseline emissions $ER_y = BE_y$.

5.4 Net GHG Emission Reductions and Removals

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)

01/10/2016 to 31/12/2016	47927	2	0	47,925
01/01/2017 to 31/12/2017	602,770	3	0	602,767
01/01/2018 to 31/12/2018	444,867	2	0	444,865
01/01/2019 to 30/09/2019	4,39,664	4	0	4,39,6640
Total	15,35,228	11	0	15,35,217

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 1,484,004 tCO_2e, whereas actual emission reductions achieved are 1,535,217 tCO_2e, which is approximately 3.45% higher than the estimated emission reductions. The actual emission reductions are slightly higher (3.45%) than the estimated emission reductions based on the annual average in the registered PDD. The higher production is attributed to better plant (machine) availability and hydrological conditions.

The increased generation elevates the project IRR from 10.69% to 11.06%. This is below the benchmark of 12.06%.

APPENDIX1: Meter Calibration Details

Meter location/name	Meter	Accuracy class	Serial No	Calibration frequency	Date of last calibrations	Validity of the calibration(As per the registered monitoring plan)	Validity of the calibration (As per the calibrating agency)	Calibration Agency	Date of change of meter
(Sent out) Switch yard line-1	Main Meter	0.2S	NP-7086-A	Half yearly	10-09-2019	09-03-2020	09-09-2020	ERDA [13]	Latest Meter
					13-03-2019	12-09-2019	12-03-2020	ERDA	Latest Meter
					19-09-2018	18-03-2019	18-09-2019	ERDA	Latest Meter
					25-03-2018	24-09-2018	24-03-2019	ERDA	Latest meter
					29-09-2017	28-03-2018	28-09-2018	ERDA	Latest Meter
					03-04-2017	02-10-2017	02-04-2018	ERDA	Latest Meter
					05-10-2016	04-04-2017	04-10-2017	ERDA	Latest Meter
					08-04-2016	07-10-2016	07-04-2017	ERDA	Latest Meter
	Check Meter	0.2S	875308	Half yearly	10-09-2019	09-03-2020	09-09-2020	ERDA	Latest Meter
					13-03-2019	12-09-2019	12-03-2020	ERDA	Latest Meter
					19-09-2018	18-03-2019	18-09-2019	ERDA	Latest Meter
					25-03-2018	24-09-2018	24-03-2019	ERDA	Latest meter
					29-09-2017	28-03-2018	28-09-2018	ERDA	Latest Meter

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					03-04-2017	02-10-2017	02-04-2018	ERDA	Latest Meter
					05-10-2016	04-04-2017	04-10-2017	ERDA	Latest Meter
					08-04-2016	07-10-2016	07-04-2017	ERDA	Latest Meter
(Sent out point) Switch yard line-2	Main Meter	0.2S	NP-6973-A	Half yearly	10-09-2019	09-03-2020	09-09-2020	ERDA	Latest Meter
					13-03-2019	12-09-2019	12-03-2020	ERDA	Latest Meter
					19-09-2018	18-03-2019	18-09-2019	ERDA	Latest Meter
					25-03-2018	24-09-2018	24-03-2019	ERDA	Latest meter
					29-09-2017	28-03-2018	28-09-2018	ERDA	Latest Meter
					03-04-2017	02-10-2017	02-04-2018	ERDA	Latest Meter
					05-10-2016	04-04-2017	04-10-2017	ERDA	Latest Meter
					08-04-2016	07-10-2016	07-04-2017	ERDA	Latest Meter
	Check Meter	0.2S	875306	Half yearly	10-09-2019	09-03-2020	09-09-2020	ERDA	Latest Meter
					13-03-2019	12-09-2019	12-03-2020	ERDA	Latest Meter
					19-09-2018	18-03-2019	18-09-2019	ERDA	Latest Meter
					25-03-2018	24-09-2018	24-03-2019	ERDA	Latest meter
					29-09-2017	28-03-2018	28-09-2018	ERDA	Latest Meter
					03-04-2017	02-10-2017	02-04-2018	ERDA	Latest Meter
					05-10-2016	04-04-2017	04-10-2017	ERDA	Latest Meter
					08-04-2016	07-10-2016	07-04-2017	ERDA	Latest Meter
	Main meter	0.2S		Half yearly	10-09-2019	09-03-2020	09-09-2020	ERDA	Latest Meter

Import meter (11 kV)			203393/34-2610		14-03-2019	13-09-2019	13-03-2020	ERDA	Latest Meter
					19-09-2018	18-03-2019	18-09-2019	ERDA	Latest Meter
					26-03-2018	25-09-2018	25-03-2019	ERDA	Latest meter
					29-09-2017	28-03-2018	28-09-2018	ERDA	Latest Meter
					03-04-2017	02-10-2017	02-04-2018	ERDA	Latest Meter
					05-10-2016	04-04-2017	04-10-2017	ERDA	Latest Meter
					08-04-2016	07-10-2016	07-04-2017	ERDA	Latest Meter