



Monitoring report form for CDM project activity
(Version 08.0)

MONITORING REPORT

Title of the project activity	4.5 MW Sechi grid-connected hydro electric project in Himachal Pradesh.		
UNFCCC reference number of the project activity	9167		
Version number of the PDD applicable to this monitoring report	Registered PDD version 08 (dated 26/04/2020)		
Version number of this monitoring report	01		
Completion date of this monitoring report	10/06/2021		
Monitoring period number	01 (of the 2 nd crediting period)		
Duration of this monitoring period	28/12/2019 – 31/12/2020 (Inclusive of both the dates)		
Monitoring report number for this monitoring period	01		
Project participants	<ul style="list-style-type: none"> ▪ Ascent Hydro Projects Ltd (AHPL) ▪ Statkraft Markets GmbH ▪ WeAct Pty Ltd. 		
Host Party	India		
Applied methodologies and standardized baselines	Methodology: AMS-I.D. - Grid connected renewable electricity generation, version 18 Standard baseline: Not Applicable		
Sectoral scopes	01, Energy Industries (renewable/non-renewable sources)		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	NA	14,967 ¹ tCO ₂ e	NA
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	18,870 ² tCO ₂ e		

¹ Detailed Calculation provided in Emission Reduction (ER) calculation excel sheet.

² Refer section E.5.1. Detailed calculation has been provided in ER sheet.

SECTION A. Description of project activity

A.1. General description of project activity

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Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:

The main purpose of the project activity is to generate hydropower and export the net electricity to the grid for sale resulting in reduction of greenhouse gas emissions in atmosphere, which could have occurred otherwise, from the regional grid. The project activity is run of river Small Hydroelectric Project (SHP) of 4.5 MW installed capacity developed at Sechi khad (stream) in Samej village of Himachal Pradesh. The 4.5 MW Sechi SHP comprise of two units of 2.25 MW with an annual average generation of 22.885 GWh. The generated electricity after auxiliary consumption shall be exported to Himachal Pradesh State Electricity Board (HPSEB) grid for sale. The connection point with the grid for Sechi SHP, is Jhakri Substation, which is at a distance of 4.5 kilometres from the project site. The project activity converts the potential energy available in water flows to mechanical energy using turbines which drives generators to generate electricity. Sechi Khads (streams) is a tributary of Sutlej River and the SHP is located along the streams.

Brief description of the installed technology and equipment:

The project installs two units of 2.25 MW Horizontal Francis turbine coupled with synchronous generator. Water from the streams is diverted using a trench weir. The trench shall be below the bed level with a width of 2.0 m and a depth uniformly varying from 1.8 m to 3.3 m at the intake structure. A trash rack grill is provided on top of the trench opening, sloped in flow direction to prevent settling of stones and pebbles and to facilitate them rolling away with the stream flow. The water from the intake structure flows to a desilting chamber. Desilting chamber is provided to exclude particle sizes exceeding 0.25 mm. The removal of silt is affected through a reduction in flow velocity by increasing the flow area. The settled silt is removed by a flushing arrangement and clear water flows from the top. The water conductor system takes the water to the forebay. The water from the forebay is taken to the power house through a penstock. A single steel penstock aligned on the hill slope shall be provided to lead the flow to the power house.

The details of the technology and equipment's are listed in the Appendix 1.

Relevant dates for the project activity:

The project activity has been commissioned on 01/02/2012. The project activity has been registered with UNFCCC on 26/12/2012 with renewable crediting period. The duration of the first crediting period is from 28/12/2012 to 27/12/2019, which was the last crediting period. The first monitoring period was 28/12/2012 to 31/07/2015, which was successfully completed with the issuance of 41,093 tCO₂e. Second monitoring period was from 01/08/2015 to 31/05/2016, which was successfully completed with the issuance of 8,942 tCO₂e. Third monitoring period from 01/06/2016 to 31/12/2017, the project has achieved emissions reduction of 23,612 tCO₂e. Fourth monitoring period from 01/01/2018 to 31/03/2019, the project has achieved emissions reduction of 14,327 tCO₂e. Whereas, the fifth monitoring period from 01/04/2019 to 27/12/2019 is currently under verification.

The duration of the second crediting period is from 28/12/2019 to 27/12/2026, which is the current crediting period.

Emission reductions achieved in the 1st monitoring period of 2nd Crediting Period:

The current monitoring period is the 1st monitoring under the 2nd crediting period. During the current monitoring period i.e., from 28/12/2019 to 31/12/2020 (inclusive of both the dates), the project has achieved emissions reduction of 14,967 tCO₂e.

A.2. Location of project activity

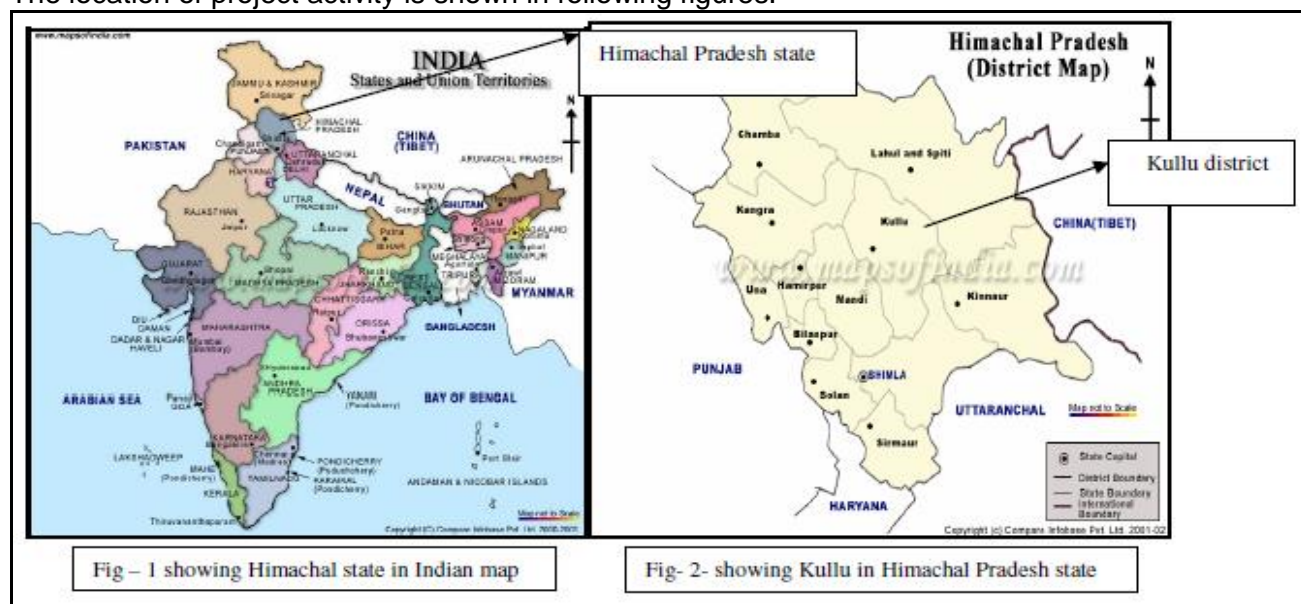
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The project activity is located as follows:

Host Part(ies) : India
 Region : North India
 State : Himachal Pradesh
 District : Kullu

The project activity is located at 31° 32' 00" N latitude and 76° 02' 30" E longitude. The nearest big town is Rampur at a distance of 30 kms. The projects are accessible by National Highway (NH)-22 which runs from Shimla to Tibet. The nearest town is Shimla. Kalka is the major railway station and is about 80 kilometers from Shimla. Kalka is about 300 kilometers from New Delhi, the capital city of India.

The location of project activity is shown in following figures.



A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Ascent Hydro Projects Ltd. (AHPL) (Private Entity)	No
Switzerland	Statkraft Markets GmbH (Private Entity)	No
Australia	WeAct Pty Ltd. (Private Entity)	No

A.4. References to applied methodologies and standardized baselines

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Approved baseline and monitoring methodology:

Renewable electricity generation for a grid in accordance with approved small-scale methodology AMS I.D.

Type I : Renewable energy project

Sectoral Scope : 01, Energy Industries

Category I.D. : Grid connected renewable electricity generation, version 18³

³ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

Reference : Reference has been taken from the list of the small-scale CDM project activity categories contained in Appendix B of the simplified M&P for small-scale CDM project activities.

Tools referenced in this methodology:

- ✓ “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”⁴
- ✓ “Tool to calculate the emission factor for an electricity system”, Version 7⁵
- ✓ “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, version 03⁶

Standardized baseline: Not applicable.

A.5. Crediting period type and duration

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Crediting Period : Renewable crediting period (3*7 years).

Start date of the 1st Crediting Period : 28/12/2012

End date of the 1st Crediting Period : 27/12/2019

Start date of the 2nd Crediting Period : 28/12/2019

End date of the 2nd Crediting Period : 27/12/2026

Duration of the Current Monitoring Period : 28/12/2019 – 31/12/2020

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf>

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project activity⁷ is a small hydropower projects supplying electricity to the Himachal Pradesh grid, part of northern regional grid integrated in Northern Eastern Western and North Eastern (NEWNE) grid, which is being supplied by several fossil fuels generating units. The emission reductions of the project activity arise from net electricity exported to the grid. The project activity consists of run-of-the-river hydropower plants generating electricity from a renewable source of energy. In the absence of the project activity, equivalent amount of electricity would have been produced from other sources of energy such as fossil fuels comprising the Northern Eastern Western and North Eastern (NEWNE) grid which would have released greenhouse gases into the atmosphere.

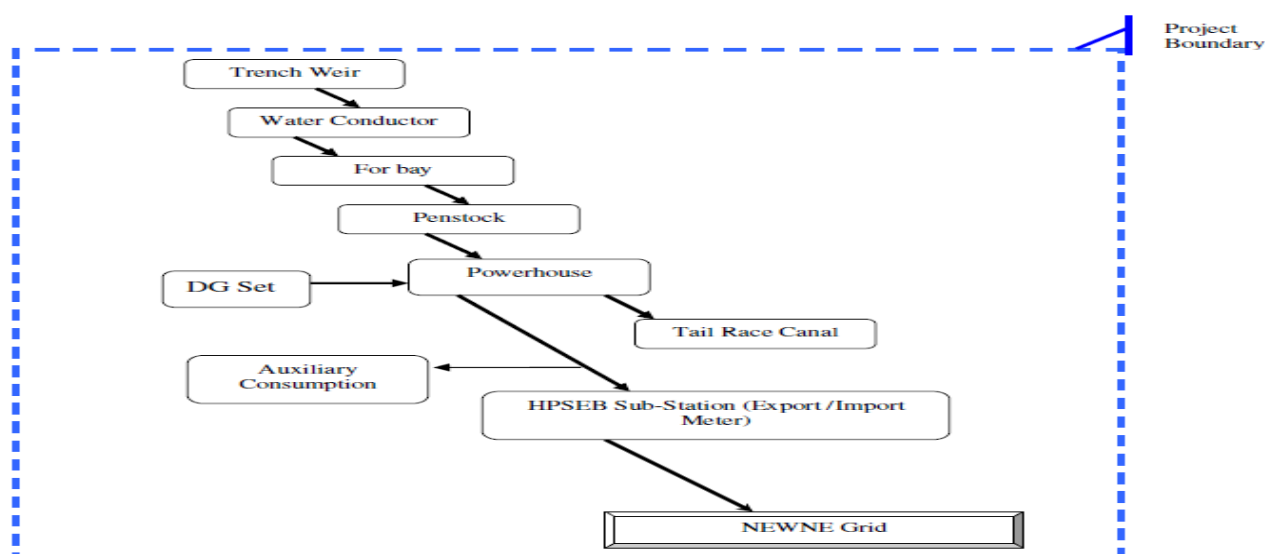
The project was registered with UNFCCC on 26/12/2012 with renewal crediting period starting from 28/12/2012 to 27/12/2019 (first crediting period), while renewal of second crediting period was approved on 08/10/2020 with the start date 28/12/2019 to 27/12/2026. The start date of the project activity was 20/02/2007 and project has been commissioned on 01/02/2012.

For the project activity, the project boundary is from the point of water tapping to the point of electricity supply to the grid interconnection point. Thus, the project boundary is as follows:

- Trench weir
- Water conductor
- Fore bay
- Penstock
- Powerhouse
- Tail race canal
- Transmission line to grid connection
- Grid interface

The project boundary also includes a stand-by diesel generator (DG) set which is operated only as a failsafe option or stand by power requirements in case the power plant is not operating. The North Eastern (NEWNE) regional grid is included in the project boundary.

Schematic Diagram of the Project Activity:



⁷ Details of technology employed is provided in Appendix 1

The capacities of the project equipment(s) are not changed during this monitoring period and no emergency incidents occurred during this period which may change the applicability of the methodology or change the emission reductions. Further, the plant was in continuous operation during the monitoring period.

B.2. Post-registration changes**B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents**

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Not Applicable

B.2.2. Corrections

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Not Applicable

B.2.3. Changes to the start date of the crediting period

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Not Applicable

B.2.4. Inclusion of monitoring plan

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Not Applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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Not Applicable

B.2.6. Changes to project design

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Not Applicable

B.2.7. Changes specific to afforestation or reforestation project activity

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Not Applicable

SECTION C. Description of monitoring system

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According to the registered PDD, following parameters are being monitored in the project activity. The general principles for monitoring above parameters are based on:

- ✓ Frequency
- ✓ Data recording
- ✓ Reliability
- ✓ Experience and training

Frequency

Monthly joint meter reading (JMR) of main meters installed at the substation are taken and signed by authorised officials of AHPL and HPSEB. Daily data recording by the shift in-charge of AHPL are available at the generation end and interconnection point. JMR are the basis for monthly invoice of net energy exported to the grid.

Data recording

Records of the monthly joint meter reading of net energy exported to the grid are maintained by AHPL and HPSEB. Daily and monthly reports stating the generation, auxiliary consumption, total electricity export and import, diesel consumption are prepared by the shift in-charge in AHPL.

Reliability

For measuring the net energy exported to the grid, one main meter and one check meter is maintained. Main meter reading is the basis of billing and emission reduction calculations. During this monitoring period the meter is found to be within prescribed limits of accuracy during half yearly check. Monthly JMR of main meters are taken and signed by authorised officials of AHPL and HPSEB once in every month. Records of the JMR are maintained by AHPL and HPSEB.

Procedure for data uncertainty:

The main and check meter are test/checked for accuracy every six months and sealed by HPSEB in presence of representative of AHPL. The calibration of meters is as per IS standards. Both main (billing) and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.

The details of meters and their test schedules are given below:

Monitoring equipment	Energy Meter			
Make & Model	Secure Meters Limited, E3M021			
Type	Tri Vector meter 3Ph 4 Wire			
PT Ratio	22KV/110V			
CT Ratio	200/1A			
Monitoring parameter	EG _{Export} & EG _{Import}			
Meters Identification Number/Sr. No.	HPU 03069	HPU 03840	HPU 00332	HPU 00333
Accuracy Level	0.2s	0.2s	0.2s	0.2s
Calibration frequency requirement as per registered PDD	Six Month	Six Month	Six Month	Six Month
Date of Calibration	18-Jun-2019	18-Jun-2019	4-Jan-2020	4-Jan-2020
Validity of calibration as per Calibration Certificate	18-Sep-2019	18-Sep-2019	3-Sep-2020	3-Sep-2020

Date of Calibration	9-Nov-2020	9-Nov-2020	-	-
Validity of calibration as per Calibration Certificate	23-Oct-2021	23-Oct-2021	-	-
Delays in Calibration (if any)	No Delay	No Delay	No delay	No delay
Calibration Conducting Entity	Power Grid Corporation of India Ltd., Jalandhar Punjab	Power Grid Corporation of India Ltd., Jalandhar Punjab	Power Grid Corporation of India Ltd., Jalandhar Punjab	Power Grid Corporation of India Ltd., Jalandhar Punjab
Accreditation Certificate for the calibration entity issuing authority relevant	NABL accredited	NABL accredited	NABL accredited	NABL accredited

The calibration schedule is not under the direct control of PP and it is solely controlled by State Electricity Board, i.e., HPSEB. The HPSEB has conducted the annual calibration of all energy meters by third party laboratory (NABL accredited). Therefore, all energy meters which are calibrated have their validity of calibration as one year as per the NABL certified Lab. But PP has adopted & following the six-monthly calibration validity period throughout the current monitoring period. But, as per the prevailing practice the set of energy meters (i.e., main & check meter) is replaced with other set of calibrated energy meters (i.e., main & check) on/before completion of every six month, which is evident from the below table. Therefore, the calibrated energy meters (i.e., set of main & check meters) were ultimately used for/or less than six-month period, which is exactly followed at project site. Thus, practically the frequency of meter replacement becomes the validity/frequency of meter calibration; hence the requirement of calibration frequency is met as per the registered PDD. Thus, there is no delay in calibration experienced during the entire monitoring period.

Therefore, all energy meters were calibrated throughout the current monitoring period. However, there is delay by 2 days during the half yearly energy meters replacement in the month of Jan 2020 and thereafter delay of 129 days which has happened in the month of Nov 2020 (as per HPSEB procedure). Please note, due to the pertaining situation of COVID-19 in the region during year 2020 there was delay of 129 days in meter replacement. But, as per the prevailing practice the set of energy meter (i.e., main & check meter) HPU00333 and HPU00332 is replaced with other set of calibrated energy meters HPU03069 & HPU03840 (i.e., main & check) and vis-versa in the set frequency of six months. These delays in meters replacement are evident from the table below. Therefore, for a conservative estimation of ER, PP has applied the maximum permissible error for the whole month of Jul 2019 in line with the VVS (Version 2) para 366a.

Also, as per registered PDD, if during half yearly test checks, the main meter and check meter are both found to be beyond permissible limits of error, then both meters shall be replaced with calibrated meters by PP under the supervision of HPSEB. The electricity authority shall conduct all the tests on the main and check meters in presence of the representatives of project proponents. In this case, when both the meter found faulty simultaneously, this is very unlikely; then as per the PPA Clause 7.11 Energy exported will be computed on a mutually agreeable basis between the Company and the Board for that particular period.

During the current monitoring period there was no such incidence occurred, however meter replacement was done during the monitoring period as per prevailing practice which are indicated in the table along with details below:

Year	Date	Meter with Sr. No. as Removed on date	Meter with Sr. No. as Installed on date	Calibration of installed meter	Calibration valid up to	Delays in replacement (if any)
2020	7-Jan-2020	HPU03069 (Main Meter)	HPU00332 (Main Meter)	4-Jan-2020	3-Sep-2020	2 days delay
		HPU03840 (Check Meter)	HPU00333 (Check Meter)	4-Jan-2020	3-Sep-2020	
	12-Nov-2020	HPU00332 (Main Meter)	HPU03840 (Main Meter)	9-Nov-2020	23-Oct-2021	129 days delay
		HPU00333 (Check Meter)	HPU03069 (Check Meter)	9-Nov-2020	23-Oct-2021	

Note: Till date 07/01/2020, the HPU03069 is the Main Meter and HPU03840 is used as the Check Meter. And from 07/01/2020 to 12/11/2020, the HPU00332 is the Main Meter and HPU00333 is used as the Check Meter. Similarly, this six-monthly cycle of meter replacement continued as mentioned in above table.

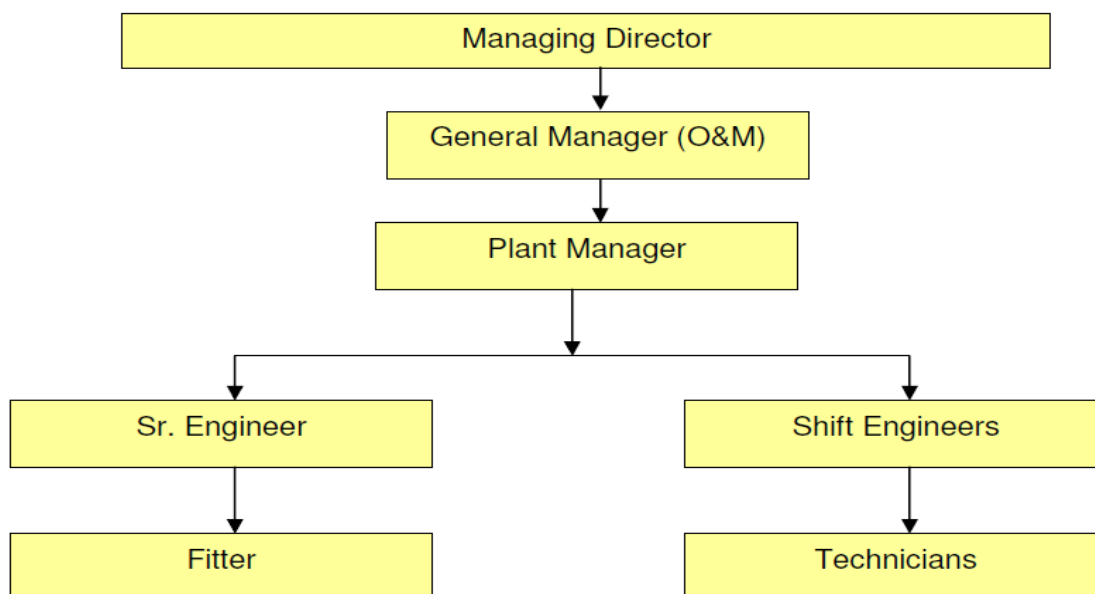
Data archiving and safe storage responsibility:

AHPL archives and preserves all the monthly invoices raised against net saleable energy parameters. Managing director and Plant Manager shall be responsible for the safe storage of the archived data.

Interruptions:

Number of tripping due to grid failure has been recorded.

The operational and management structure of the project activity is given below:



Managing Director of AHPL is based in head office in Pune, Maharashtra state, India and periodically visits the plant. A Shift engineer shall be available in each shift. Shift engineers are involved in operation and maintenance of hydroelectric plants and are assisted by technicians. Senior Engineer shall be assisted by a fitter who shall be responsible for on-site maintenance of the equipment, preventive maintenance etc.

Monitoring measurements and reporting:

The shift engineer records the readings from main meter and check meter daily and these readings are counter-checked by the Plant Manager. Daily reports are sent to respective head office electronically and monthly reports are generated and maintained at the plant and head office.

Records of JMR are maintained by Plant Manager. Monthly invoices are prepared based on JMR which can be cross checked from the payment received against the invoice.

Procedures for maintenance of monitoring equipment and installations:

In the context of the identified project activity, energy meter is the only equipment which is required to track the monitoring parameters as per the registered monitoring plan. As per the power purchase agreement (PPA) with HPSEB, the energy meters and the meter boxes are owned and kept sealed by the HPSEB and hence shall be maintained by HPSEB.

Procedure for internal audits & project performance review:

The internal audit team comprises Managing Director, General Manager (OM), Plant Manager and Engineer of AHPL. The internal audit is conducted once in a year. The internal audit team is responsible for the review and follow-up of corrective actions.

Procedure for data apportioning:

In the event when the verification period dates and billing cycle dates (JMR dates) do not coincide, daily export and import reading from main and check meter would form the source of emission reduction calculation for that period. The daily export and import readings are taken manually from the main and check meter on monthly basis in the presence of representative of AHPL and HPSEB. The method of calculation is considered as per the registered monitoring plan.

In the current monitoring period, the JMR date for a particular month is the 1st day of the successive month.

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante**

Data/Parameter	EF_{grid,CM,y}
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Central Electricity Authority (CEA), CO ₂ baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.88854
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data/parameter	Calculation of baseline emission.
Additional comments	The emission factor has been fixed for the second crediting period.

Data/Parameter	EF_{grid,OM,y}
Unit	tCO ₂ /MWh
Description	Operating Margin for the Indian grid
Source of data	Central Electricity Authority (CEA), CO ₂ baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.9610
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data/parameter	Calculation of baseline emission.
Additional comments	The emission factor has been fixed for the second crediting period.

Data/Parameter	EF_{grid,BM,y}
Unit	tCO ₂ /MWh
Description	Build Margin for the Indian grid
Source of data	Central Electricity Authority (CEA), CO ₂ baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.8644
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data/parameter	Calculation of baseline emission.
Additional comments	The emission factor has been fixed for the second crediting period.

Data/Parameter	P
Unit	kg/ltr
Description	Density of diesel

Source of data	http://www.fast-tek.com/TM104.pdf http://www.iocl.com/Products/DieselSpecifications.pdf
Value(s) applied	0.860
Choice of data or measurement methods and procedures	Fixed Value has been taken from the publicly available data source.
Purpose of data/parameter	Calculation of project emission
Additional comments	This has been fixed ex-ante for second crediting period.

D.2. Data and parameters monitored

Data/Parameter	EG_{BL,y}
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
Measured/calculated/default	Calculated
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) of monitored parameter	16,846.72 ⁸
Monitoring equipment	Value has been calculated from the Energy export and Import values, which are recorded in the main & check meters.
Measuring/reading/recording frequency	Monthly
Calculation method (if applicable)	$EG_{BL,y} = EG_{Export} - EG_{Import}$ <p>The calculated value of this parameter is indicated in the JMR which is prepared by HPERC as per PPA.</p> <p>Quantity of net electricity supplied to the grid in year y is the difference between the measured quantities of the grid export and import.</p>
QA/QC procedures	This figure can be cross verified using the Invoices raised by the company and also from the payment received by the company from HPSEB for the month.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the crediting period.

Data/Parameter	EG_{Export}
Unit	MWh
Description	Total electricity export to the grid by the project activity in year y
Measured/calculated/default	Measured
Source of data	Monthly Joint Meter Reading (JMR)

⁸ Detailed Calculation provided in Emission Reduction (ER) calculation excel sheet.

Value(s) of monitored parameter	16,866.64 ⁹
Monitoring equipment	Value has been taken from records of the main & check meters. Details are provided under the section C.
Measuring/reading/recording frequency	The parameter is monitored continuously on a real time basis ¹⁰ and recorded monthly basis
Calculation method (if applicable)	<p>Data Type: Measured;</p> <p>The units exported are measured at the main meter and check meter at the substation interconnection point. Monthly joint meter reading of main meters installed at the substation shall be taken and signed by authorised officials of AHPL and HPSEB. Joint meter reading shall be the basis for monthly invoice of net energy exported to the grid.</p> <p>Data Archiving: Paper/ Electronic; Records of the joint meter reading of net energy exported to the grid shall be maintained by AHPL. Daily and monthly reports stating the net power export shall be prepared by the shift in-charge and verified by the plant manager of AHPL.</p> <p>Calibration Frequency: Once in every 6 months.</p>
QA/QC procedures	<p>For measuring the net energy exported to the grid, one main meter and one check meter, of accuracy class 0.2s, are maintained. Main meter reading is the basis of billing and emission reduction calculations, as the meter is found to be within prescribed limits of accuracy during the test.</p> <p>As per the PPA, the calibration of meters shall be done in every six months. Both main and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.</p>
Purpose of data/parameter	Calculation of baseline emission
Additional comments	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the crediting period

Data/Parameter	EG_{Import}
Unit	MWh
Description	Total electricity imported from the grid by the project activity in the year y
Measured/calculated/ Default	Measured
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) of monitored parameter	19.91
Monitoring equipment	Value has been taken from records of the main & check meters. Details are provided under the section C.
Measuring/reading/recording frequency	The parameter is monitored continuously on a real time basis and recorded monthly basis

⁹ Month-wise details are provided in Emission Reduction (ER) calculation excel sheet.

¹⁰ Electricity export and import values are monitored on a continuous basis through dedicated energy meter of 0.2s accuracy class installed at grid substation. The export and import values are measured automatically on a real time basis which ensures hourly measurement as per requirement of the methodology.

Calculation method (if applicable)	<p>Data Type: Measured:</p> <p>The units imported are measured at the main meter and check meter at the interconnection point at the substation. Monthly joint meter reading of main meters installed at the substation shall be taken and signed by authorized officials of AHPL and HPSEB. Joint meter reading shall be the basis for monthly invoice of net energy exported to the grid.</p> <p>Data Archiving: Paper/ Electronic; Records of the joint meter reading of net energy exported to the grid shall be maintained by AHPL. Daily and monthly reports stating the net power export shall be prepared by the shift in-charge and verified by the plant manager of AHPL.</p> <p>Calibration Frequency: Once in every 6 months.</p>
QA/QC procedures	<p>For measuring the net energy exported & Import, one main meter and one check meter, of accuracy class 0.2s, will be maintained. Main meter reading is the basis of billing and emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during half yearly check.</p> <p>As per the PPA, the calibration of meters shall be done in every six months. Both main and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.</p>
Purpose of data/parameter	Calculation of baseline emission
Additional comments	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the crediting period

Data/Parameter	DC _y
Unit	Litres
Description	Diesel consumption by the standby DG set in year y
Measured/calculated/default	Calculated
Source of data	Plant log book
Value(s) of monitored parameter	189 ¹¹
Monitoring equipment	The diesel quantity available in the diesel storage tanks is recorded daily by AHPL in the plant log book. The diesel consumption would be recorded in the logbook in litres. However, based on the density of diesel of about 0.86 kg/litre, the diesel consumption in tons would be calculated.
Measuring/reading/recording frequency	Continuously and recorded monthly basis.

¹¹ Month-wise details are provided in Emission Reduction (ER) calculation excel sheet.

Calculation method (if applicable)	<p>Data Type: Measured & Calculated</p> <p>1) The diesel quantity available in the diesel storage tanks is recorded as initial and final reading as and when used on the basis of level gauge by AHPL in the plant log book.</p> <p>2) AHPL also maintain the record of DG set running hours and the kWh generated by the DG set.</p> <p>3) The level gauge has marking of 10 lit (Least Count) up to the 300 Lit (Total Capacity of diesel tank) which is calibrated manually every year. The Level Gauge of DG set is a standard scale and mounted inside the cap of fuel tank. Annually, the calibration of level gauge is carried out by checking the standard marking of 10 Lit (Least Count) up to the 300 Lit (Total Capacity of diesel tank) and comparing the level of tank by filling the measured quantity of Diesel (litre as mentioned in purchase receipt) in to tank. The records of filling of tank is maintained in DG set log book at Project site.</p> <p>4) The diesel consumption would be recorded in the plant logbook in liters. The values are converted to tons using a factor 0.86 kg/liters (density of diesel), for the purpose of calculation.</p> <p>5) The diesel is consumed only in the rare situation only when the power plant is not operational.</p> <p>6) This value is used for project emission calculation.</p> <p>Data Archiving: Paper/ Electronic.</p>
QA/QC procedures	The measured data can be cross checked with total diesel procurement using payment receipts.
Purpose of data/parameter	Calculation of project emission.
Additional comments	The data would be archived up to two years after the end of crediting period.

Data/Parameter	NCV _{diesel,y}
Unit	GJ/Ton
Description	Net calorific value of the Diesel in year y
Measured/calculated/ Default	Default
Source of data	As options a, b & c are not available, the project proponent chooses option d i.e., IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories and is fixed Ex-ante. This is in accordance to the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" version 02
Value(s) of monitored parameter	43.30
Monitoring equipment	IPCC Default Value is considered
Measuring/reading/recording frequency	Not applicable.

Calculation method (if applicable)	IPCC Default Value. As per the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion", any future revision of the IPCC Guidelines should be taken into account. As the value considered in the registered version is conservative, hence same has been considered here.
QA/QC procedures	IPCC latest guideline.
Purpose of data/parameter	Calculation of project emission
Additional comments	The data would be archived up to two years after the end of crediting period.

Data/Parameter	EF _{CO₂,diesel,y}
Unit	tCO ₂ e / TJ
Description	CO ₂ emission factor of diesel in year y
Measured/calculated/Default	Default
Source of data	As options a,b & c are not available, the project proponent chooses option d i.e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories and is fixed Ex-ante. This is in accordance to the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" version 02.
Value(s) of monitored parameter	74.8
Monitoring equipment	IPCC default value has been considered
Measuring/reading/recording frequency	Not required.
Calculation method (if applicable)	IPCC default values. As per the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion", any future revision of the IPCC Guidelines should be taken into account. As the value considered in the registered version is conservative, hence same has been considered here.
QA/QC procedures	IPCC Latest guideline
Purpose of data/parameter	Calculation of project emission
Additional comments	The data would be archived up to two years after the end of crediting period.

D.3. Implementation of sampling plan

>>

Not Applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

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The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} \times EF_{CO_2, grid, y}$$

Where:

BE_y : Baseline Emissions in year y (tCO₂)

$EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO_2, grid, y}$: CO₂ emission factor of the grid in year y (tCO₂e/MWh)

Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y ($EG_{BL,y}$) is equal to total electricity exported to the grid (EG_{Export}) minus total electricity imported from the grid (EG_{Import}).

$$\begin{aligned} \text{Thus, } EG_{BL,y} &= EG_{Export} - EG_{Import} \\ &= (16,866.64 - 19.91) \text{ MWh} \\ &= \mathbf{16,846.72 = 16,846 \text{ MWh (rounded down value)}} \end{aligned}$$

Therefore,

$$\begin{aligned} BE_y &= EG_{BL,y} \times EF_{CO_2, grid, y} \\ &= 16,846 \times 0.88854 \text{ tCO}_2\text{e} \\ &= \mathbf{14,968 \text{ tCO}_2\text{e (rounded down conservatively)}} \end{aligned}$$

E.2. Calculation of project emissions or actual net removals

>>

Diesel consumption

The project also involved consumption of minor quantity of Diesel in standby DG Set. The formula used to calculate the project emissions due to diesel consumption is provided below:

$$PE_{Diesel} = \sum DC_y \times P \times NCV_{Diesel} \times EF_{CO_2 Diesel}$$

Where:

PE_{Diesel} : Project emission due to diesel consumed during this monitoring period in DG set

DC_y : Diesel consumption in Liters (L)

P : Density of diesel (0.86 kg/lit)

NCV_{Diesel} : Net calorific value of diesel

$EF_{CO_2 Diesel}$: IPCC 2006 Emission factor for diesel

$$\begin{aligned} PE_{Diesel} &= 189 \text{ L} \times (0.86 \times 10^{-3}) \text{ tonne/L} \times 43.30 \text{ GJ/tonne} \times 0.0748 \text{ tCO}_2\text{/GJ} \\ &= 0.526 \text{ tCO}_2\text{e} \\ &= \mathbf{1 \text{ tCO}_2\text{e (rounded-up conservatively)}} \end{aligned}$$

E.3. Calculation of leakage emissions

>>

As per paragraph 22 of AMS-I.D. version-18, 'If the energy generating equipment is transferred from another activity, leakage is to be considered.' In the project activity, there is no transfer of energy generating equipment and therefore the leakage from the project activity is considered as zero. That is $LE_y = 0$.

Thus, $ER_y = BE_y - PE_y - LE_y$

Where:

ER_y Emission reductions in year y (tCO_2/y)

BE_y Baseline Emissions in year y (tCO_2/y)

PE_y Project emissions in year y (tCO_2/y)

LE_y Leakage emissions in year y (tCO_2/y)

Hence, $ER_y = 14,968 - 1 - 0 \text{ tCO}_2\text{e}$
 $= 14,967 \text{ tCO}_2\text{e}$

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals ($t \text{ CO}_2\text{e}$)	Project GHG emissions or actual net GHG removals ($t \text{ CO}_2\text{e}$)	Leakage GHG emissions ($t \text{ CO}_2\text{e}$)	GHG emission reductions or net anthropogenic GHG removals ($t \text{ CO}_2\text{e}$)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
Total	14,968	1	0	0	14,967	0	14,967

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period ($t \text{ CO}_2\text{e}$)	Amount estimated ex ante for this monitoring period in the PDD ($t \text{ CO}_2\text{e}$)
14,967	18,870

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

>>

As per registered CDM-PDD (version 08, dated: 26/04/2020), the annual estimated volume of CERs is 18,742 $tCO_2\text{e}$. The total nos. of days included in this monitoring period (i.e., 28/12/2019 to 31/12/2020, inclusive of both the days) = 370. Thus, to calculate the ex-ante estimated value of ER corresponding to this monitoring period, the annual estimated ER value (as per registered PDD) has been extrapolated for the equivalent period, i.e., 370 days, which results in 18,870¹² $tCO_2\text{e}$. Whereas actual ER achieved is 14,967 $tCO_2\text{e}$. The detailed calculation has been provided in ER calculation sheet.

¹² Ex-ante estimated annual ER as per registered PDD = 18,742; = $18,742/365 = 51 \text{ tCO}_2\text{e per day}$.

Ex-ante estimated value corresponds to this monitoring period = $51 \times 370 = 18,870 \text{ tCO}_2\text{e}$.

E.6. Remarks on increase in achieved emission reductions

>>

There is no increase in the emission reductions during the current monitoring period relative to the estimation in the registered CDM-PDD. However, there is around 20.68%¹³ lesser emission reduction relative to estimation in the registered CDM-PDD for the equivalent duration of the monitoring period. This is envisaged mainly due to the lower PLF during the monitoring period.

E.7. Remarks on scale of small-scale project activity

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The project activity is a Type-I category small scale 4.5 MW Sechi SHP comprise of two units of 2.25 MW hydroelectric project and there is no change in the rated capacity of project activity has happened during this monitoring period and crediting period which may lead to the change in the scale of project activity.

¹³ Please refer to the ER calculation sheet for the detailed calculation of the same.

Appendix - 1

Technology of the project activity:

Description	Sechi SHP
Installed capacity	4.5 MW
<u>Trench weir</u>	
Design discharge	5.175 m ³ /s
Elevation	1454.8 m
<u>Intake to desilting tank</u>	
Design discharge	5.175 m ³ /s
Length	167 m
<u>Desilting tank to forebay</u>	
Design discharge	4.14 m ³ /s
Length	1225 m
Capacity of Forebay	750 m ³
Top level of Forebay	1454.34 m
<u>Penstock</u>	
Number	1
Length and size	234 m of 1.3 m diameter
Number of generating units	2

Description	Sechi SHP
No of Turbine	2
Type of turbine	Horizontal Francis turbine coupled with synchronous generator
Number of generators	2
Rated Output	2.25MW
Overload capacity ⁴	10%
Rated Voltage	6.6 KV \pm 10%
Frequency	50Hz
Generator floor level	1315.1 m
Gross head	129.4 m
Net head design	125.9 m
Voltage	22 kV
Connection to grid	Jhakri Susbtation of HPSEB at a distance of 4.5 kilometres away

	97.38 % at 75% load 96.69 % at 50% load 94.90 % at 25% load
Rated voltage	11 kV
Serial No.	C21 /001
Connection to grid	
Transformer capacity	132kV, 17.5MVA, 3 phase, OMAN
Connection point	BH-1 switchyard
Protection System	Multi functional digital relay system
Control & monitoring operation	Computer based c/w interface for remote operation

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
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