Monitoring report form for CDM project activity
(Version 08.0)

MONITORING REPORT			
Title of the project activity	2.2 MW hydropower plant in Birsinghpur, Madhya Pradesh of Ascent Hydro Projects Limited (AHPL)		
UNFCCC reference number of the project activity	1280		
Version number of the PDD applicable to this monitoring report	Registered PDD Version 06.2 (dated 10/01/2015)		
Version number of this monitoring report	01		
Completion date of this monitoring report	05/06/2021		
Monitoring period number	04 (of the 2nd crediting period)		
Duration of this monitoring period	01/04/2019 – 31/12/2020 (Inclusive of both the dates)		
Monitoring report number for this monitoring period	NA		
Project participants	▪ 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; Dated: 27/11/2014 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	19,054[1] tCO_2e	NA
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	25,034[2] tCO_2e		

[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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AHPL is a subsidiary of Dodson–Lindblom International Inc. (DLI), USA-based water resource company involved in developing and operation of hydroelectric plants. AHPL is operating a 2.2 MW hydroelectric project at Birsinghpur in Madhya Pradesh on Build, Own, Operate and Maintain (BOOM) basis for thirty years. The project activity, "Birsinghpur hydroelectric project" is located outside the premises of Sanjay Gandhi Thermal Power Station (SGTPS) owned and operated by Madhya Pradesh Power Generating Company Ltd (MPPGCL), formerly Madhya Pradesh State Electricity Board (MPSEB). The project activity is constructed between the intake channel and the return canal of the thermal power plant.

Relevant dates of the Project activity:

S. No	Activity	Date
1	Unit I of the project activity has started commercial operation from	24/10/2006
2	Unit II of the project activity has started commercial operation from	06/02/2007
3	Project activity has been registered with UNFCCC on	25/11/2007
4	Project activity has successfully completed Ist Crediting Period[3]	25/11/2007 – 24/11/2014
5	PP has re-intimated to UNFCCC for renewal of crediting period on	18/12/2014
6	PP has received acceptance confirmation from UNFCCC for the same	05/01/2015
7	Project activity has also successfully achieved the renewal[4] of crediting period under CDM	13/06/2015
8	Project activity IInd crediting period (current)	15/06/2015 – 24/11/2021
**Project activity is in continuous operation since the commissioning date of Unit 1.		

Purpose of the Project Activity:

The main purpose of the project activity is to utilize condenser-cooling water and available head between the water level in the seal pit and the water level in the return canal for the generation of electricity. In SGTPS, there are four units of 210 MW and one unit 500 MW and all the system operates on lake storage cooling system. A huge reservoir is available near the thermal power station. Cooling water for condensers is drawn from the reservoir on River Johilla through the intake canal to the cooling water pump house. Cooling water requirement of 500 MW unit and disposal is met through a separate water system. Three (3) pumps are provided in the pump house to meet the cooling system requirement of each thermal unit of 210 MW. Each pump has a pumping capacity of 10,000 cum/hr. Thus, the total quantity of circulating cooling water for each thermal unit is of the order of 30,000 cum/hr.

The Water is circulated through the cooling condensers of the steam generating units by the circulating water pumps. After cooling of the condensers, this water is returned back to the reservoir by a return canal through the seal pit. Water pumped for cooling of auxiliaries is also

[3] Total CERs issued from the Ist Crediting Period – 91,578 tCO_{2e}
[4] https://cdm.unfccc.int/Projects/DB/BVQI1186166310.82/view

discharged through the same seal pit. This discharge is of the order of 30,000 cum/hr for each thermal unit. The total quantity of water available at the seal pit after considering losses of about 10% will be about 29,700 cum/hr (8.25 Cumecs). The project activity utilizes the return cooling water discharged by the SGTPS. The crest level of seal pit is about 9 meters high from the canal bed.

The difference of elevation between the water level in the seal pit and the water level in the return canal provides the head and the quantity of water discharging from the seal pit provides the flow for the Birsinghpur mini hydro power project. This „head" is being harnessed to produce electricity in the project activity and thus helps in reducing the Green House Gas (GHG) emission. Electricity is generated at 3.3 KV and stepped up to 33 KV to feed and wheel through Madhya Pradesh Power Transmission Company Ltd (MPPTCL). The total generated electricity by the project activity in the current monitoring period is connected to the state grid and is sold to third parties viz; M/s Nicholas Piramal and M/s IPCA Laboratories. This project is amongst the first of its kind in the country utilizing condenser cooling water for power generation. PP has entered into the Power Purchase Agreement (PPA) with Madhya Pradesh Electricity Board for the sale of entire net electricity output, on 26th July 1999. However, section 3.3 of the PPA allows net electricity sale to either third party/ies (which are HT consumer of the board), on payment of wheeling charges or to the electricity board. Thus, PP signed short term PPAs for the sale of power with Nicholas Piramal India Ltd. & IPCA Laboratories on 29th April 2006 and 4th August 2006 respectively, both the parties are HT consumers of the Board.

Brief description of the installed technology and equipment:

A forebay is provided near the seal pit by constructing side walls to the top of the seal pit to have a constant head for the generating units. The turbines are so placed that a head of at least 8.1 meters is available. The water intake and power-house are connected to the Forebay, with a by-pass structure involving a spillway that allows the release of water to the return canal in the event that the small hydropower plant is shut down for any reason. Water from the Forebay is led through Intake gates to 2 units of horizontal Kaplan turbines having capacities of 1.179 MW each installed at adjacent power-house building. This water rotates the Kaplan turbines, which in turn rotates the synchronous generator coupled to the turbines and generates the electricity. The Kaplan turbines are horizontal type with adjustable guide vanes and runner blades and tubular casing. The turbine runner blades are made of cast stainless steel since the water is drawn from the upper surface of the reservoir and is less erosive than canal or river water. The runner blades are fixed on a cast steel runner hub, which is rigidly fixed to the turbine shaft. The turbine shaft is forged carbon steel adequately designed to sustain the weight and withstand the run-away speed at its coupling with the runner hub. The guide vanes are of steel casting with integral body and stem. The guide vane profile shall be ground smooth so that leakage through it is negligible when fully closed. The casting of the draft tube is “S” type tubular, fabricated from steel plates.

Emission reductions achieved in the 4th monitoring period of 2nd Crediting Period:

The duration of the current monitoring period considered under this monitoring report is 01/04/2019 to 31/12/2020 (inclusive of both the dates). The emission reduction achieved under this monitoring period is 19,054 tCO_2e.

A.2. Location of project activity

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Project activity is located in Khasra numbers 409, 410/1, 415/2 and 414/2 of the Mangthar village, Pali Taluk, Umaria District, Madhya Pradesh. The latitude and longitude coordinates of the plant are 23.36º and 81.03º respectively. The plant is about 8 kilometres from Birsinghpur railway station, which is on Bhopal –Bilaspur railway route. The district headquarters is at Umaria, which is about 40 kilometers from the plant.

The location of project activity is shown in following figures.

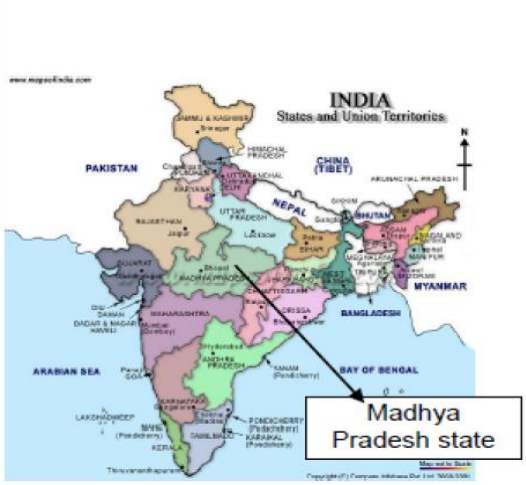


Fig - 1 Showing Madhya Pradesh state in Indian map

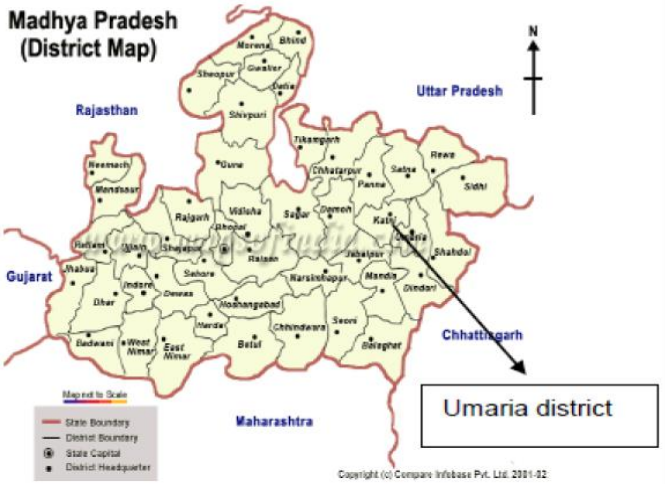
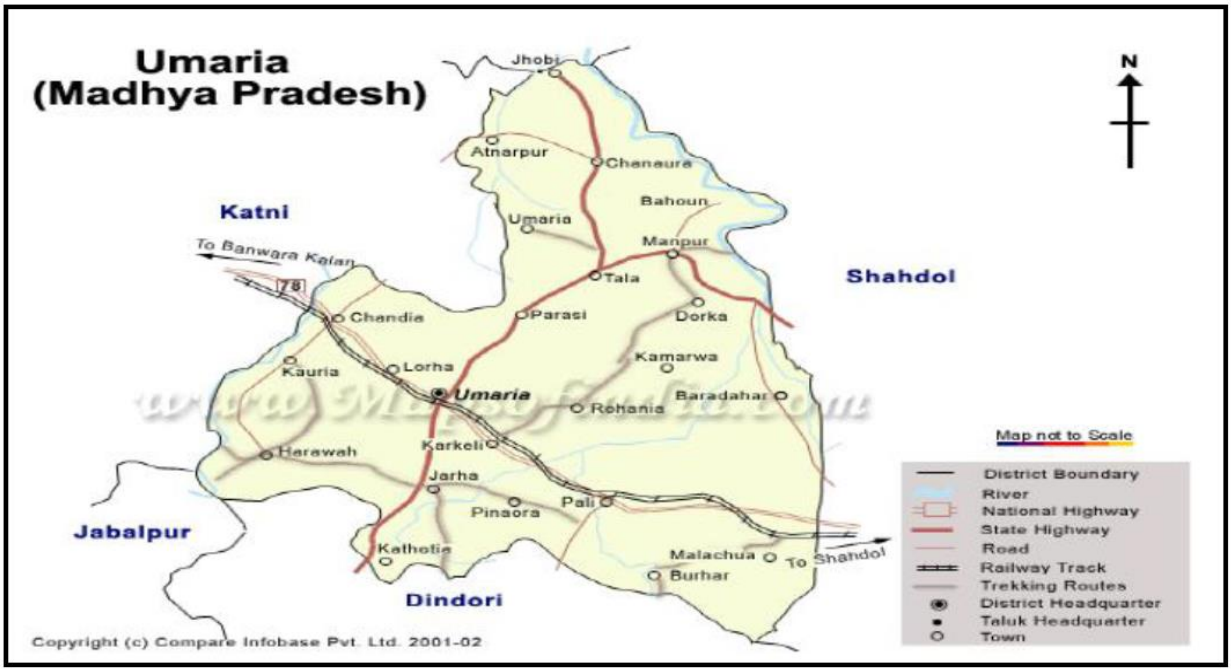


Fig- 2- showing Umaria district in Madhya Pradesh state



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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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 18[5], valid from 28/11/2014
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:

- ✓ "Tool to calculate the emission factor for an electricity system" - Version 04.0.0
- ✓ "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" - Version 02
- ✓ "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" – Version 03.0.1

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 : 25/11/2007
Duration of the 1st Crediting Period : 25/11/2007 – 24/11/2014

Start date of the 2nd Crediting Period : 15/06/2015
Duration of the 2nd Crediting Period : 15/06/2015 – 24/11/2021

Duration of the Current Monitoring Period : 01/04/2019 – 31/12/2020 (under the 2nd crediting period)

[5] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The Unit 1 of the project activity has started commercial operation from 24/10/2006 whereas the Unit II of the project activity has started commercial operation from 06/02/2007. The plant has synchronized with the grid in July 2006. The length of the crediting period for this project activity is 7 years (Renewable Crediting period).

A schematic diagram of the Project Activity has been provided in Appendix 1. No adverse situation has arisen during the monitoring period of the project which may eventually impact the applicability of the methodology and affect the additionality of the project activity.

The hydrology of the Mini Hydel project is based on the quantity of water through the cooling condensers of the steam generating units being discharged into the return canal of SGTPS through the seal pit and the head available at the seal pit. The warmed circulating water is not discharged at atmospheric pressure to avoid vapour formation within the thermal unit's condenser. A water seal is achieved by providing a concrete chamber (Seal Pit) at each pipe outlet to maintain the desired minimum pressure head of 2.5 m water column (WC). The energy of the falling water is dissipated before it enters the return canal.

The main components of projects are:

- Seal Pit
- Forebay & Bypass structure- Spillway
- Water Intake structure
- Power-house
- Return Canal to river

The details of equipment(s) installed (turbine & generator) are as follows:

Salient features of turbine:

Type	Full horizontal Kaplan
Number	2
Rated output @ rated head of 8.1 m @ rated discharge of 16.5 m^3/s @ best efficiency i.e. 92.3%	1208 kW
Rated output @ rated head of 8.1 m @ rated discharge of 16.075 m^3/s @best efficiency i.e. 92.3%	1179 kW
Rated head	8.1 m
Minimum operating head	8.10 m
Maximum operating head[6]	8.92 m
Rated discharge for each unit	16.52 m^3/sec
Minimum discharge	7.99 m^3/sec
Maximum discharge	16.50 m^3/sec
Runner diameter	1860 mm
Specific Speed	665.88 RPM
Rated Speed	265 RPM

[6] In order to avoid flooding, the plant is designed in a manner that safety gates open when head of 8.1 m is reached. Thus, maximum head that can be achieved is 8.1 m.

Turbine Setting	(-) 0.46 m
Make	Boving Fouress Limited
Minimum discharge	7.99 m^3/sec
Maximum discharge	16.50 m^3/sec

Specification of generators at Birsinghpur

Type	Synchronous
Number	2
Rated Output	1.5 MVA, 3 phase, 50 Hz i.e 1.2 MW or 1200 kW
Net Output[7] (termed as plant Output)	1102 KW
Voltage	3.3 kV
Power Factor	0.8 (lag)
Insulation	Class F
Excitation system	Brush-less
Make	Crompton Greaves Limited

Specification of Transformer

Transformer capacity	3.3/33 kV, 2.25 MVA Ynd11, 3 phase, ONAN
Connection on 3.3kV side	6.6 kV grade 185 square mm single core XLPE cable
Connection on 33 kV side	33 kV bus bar
Connection point	Plant switchyard
Protection System	50/51 (GT) over current and E/F relays and Buchholz relay, WTI, OT
Control & monitoring	Computer based c/w interface for remote operation
Circuit Breakers	SF6

Protection arrangements

- 64 G –restricted E/F relay
- 50 (ABC) over current relay
- 59 –over voltage relay
- 40G-loss of excitation relay
- Temperature monitoring system
- Speed monitoring system
- Master trip relay

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

[7] This is the electrical power at generator terminals when turbine output is 1179 kW and applying 98% efficiency of gear box & 95.4% generator efficiency, as per the contract agreement.

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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No permanent changes from registered monitoring plan, applied methodology or applied standardized baseline has been proposed or done under second crediting period.

B.2.6. Changes to project design

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No changes to the project design of registered project activity have been proposed or done under second crediting period renewal PDD version 06.2 (Dated:10/01/2015).

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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Metering system

As per the PPA, the electricity generated is to be evacuated at the 33kV Grid sub-station. However, as per the provisional permission granted by MPEB, the electricity generated is currently evacuated at interconnection point of MPPKVVCL's existing 33 kV line which delivers the electricity to the substation. The metering system in current scenario[8] is described below:

Current Scenario:

The electricity is generated at 3.3 kV which is stepped up to 33 kV and further the electricity is supplied to the grid through two bays i.e., bay 1 and bay 2. For measuring the net energy supplied to the grid, one main meter and one check meter is connected at interconnection point at each bay.

Joint Meter Reading (JMR) of main and check meters are recorded and signed by authorised officials of AHPL and MPPKVVCL once in every month. The JMR indicates readings recorded at meters connected to each bay and further it also indicates the calculated total net electricity supplied to the grid by the project activity.

The total net electricity exported to the grid, as per the JMR, will form the basis of emission reduction calculation.

Also, the main and check meters are capable of recording daily readings which is retrieved by AHPL staff in the presence of MPPKVVCL on the monthly basis and archived in electronic form. The readings will be used in case of apportioning of data when the JMR dates are not coinciding with the verification date.

Billing and Cross-checking:

The electricity generated from the project activity is sold to third parties through a wheeling arrangement with the MPPKVVCL. Further the Project Participant has retained the option of selling the electricity generated from the project activity to the MPSEB. The billing and cross-checking in either case is as below:

Sale to third party:

Based on the total net electricity supplied to the grid indicated in JMR, "statement of net energy delivered in the grid system" is raised by MPPKVVCL which indicates the value of net electricity delivered in the grid system. The value of net energy delivered in the grid system is calculated as total net electricity supplied to the grid minus wheeling charges. Accordingly, the electricity is distributed to the third party. The same is indicated in the monthly electricity bill issued by the concerned grid authority. Based on the electricity bill, AHPL raises an invoice to the third party subsequent to which third party releases the payment. The bank statement will form the basis of crosscheck of receipt of payment. There will be difference between total net electricity supplied to the grid indicated in the JMR and electricity consumption against which the payment is released due to deduction of wheeling charges.

Sale to Madhya Pradesh Electricity Board (MPEB):

Based on the total net electricity supplied to the grid indicated in JMR, AHPL will raise an invoice to MPPKVVCL, subsequent to which payment will be released. The bank statement will form the basis of crosscheck of receipt of payment.

[8] Project has been permitted to retain the existing metering arrangement (as per the approval received from the competent authority, ED-MPPTCL-Jabalpur). As such PP will not require to shift their Billing Meters (check and main) from the present position. Hence, existing scenario remains valid.

Testing/ Calibration:

The main and check meters are tested for accuracy once in a year by the representative appointed by MPPKVVCL or third party authorised by the grid authority.

The meters are jointly inspected, tested and sealed and are not be interfered with, by either AHPL or MPPKVVCL, except in presence of the other party.

Differentiation between testing and calibration:

All the meters are tested for accuracy once in a year[9] by the representative appointed by MPPKVVCL or third party authorised by the grid authority at the site itself. The portable calibrated standard meters are used for the purpose of testing whether the meters are within the permissible limits. Calibration is conducted by the MPPKVVCL only if during the testing the meter is found to be exceeding the permissible limit of error. The meter exceeding the permissible limit is removed from the site and replaced with the calibrated meter. The removed meter is then taken to the laboratory for calibration.

Procedure for handling data uncertainty:

The main and check meters would be tested once in every year and sealed by the MPPKVVCL in presence of PP. Both main and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.

a) If during yearly testing, main meter is found to be beyond permissible limits of error, the error identified would be applied to all the measured data recorded on the main meter and used for the purpose of billing, from the date of previous testing/calibration. The MPPKVVCL will be informed for further action.

In case the check meter readings have been used for few of the months for the purpose of billing, the error would not be applied to those months as long as check meter readings are within the permissible limit of error.

b) If during yearly testing, the check meter is found to be beyond permissible limits of error, the identified error would be applied all the measure data recorded, only if the check meter readings have been used for the purpose billing during the period from previous testing/calibration. However, the MPPKVVCL authority will be informed for their action.

c) If during yearly testing, the main meter and check meter are both found to be beyond permissible limits of error, the identified error would be applied to all the measured data, from the previous date of testing/calibration, and corrected values would be used for the purpose of emission reduction calculation.

d) If both, main and check meters fail to display or record the reading which is very unlikely, the MPPKVVCL authority will be informed for their further immediate action. The emission reduction will be based on the JMR raised during that month.

Procedure for data apportioning: In the event when verification period dates and billing cycle dates in the project activity, do not coincide:

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 retrieved from the main and check meter on monthly basis in the presence of representative of MPPKVVCL. The method of calculation is as explained below:

[9] Details of Energy Meter calibration has been provided under Appendix 2 of MR. It is observed that there is a delay of 11 days in calibration of energy meter has happened as the due date for energy meter calibration was 23 Sep 2018 but meter calibration was done on 4th Oct 2018. However, energy meter found operating under permissible limit of error on testing. Please refer Appendix 2 for detailed explanation.

For example, if the JMR date is 30th of a month whereas the crediting period starts on 25th of that month. The net energy supplied to the grid will be calculated as below:

Export reading on 30th	X
Export reading on 25th	Y
Total export between 25th to 30th	Z = X –Y
Import reading on 30th	A
Import reading on 25th	B
Total import between 25th to 30th	C =A – B
Net electricity supplied between 25th to 30th	E= Z – C

All the monitored data will be archived for at least two years after end of the crediting period. The monitoring period starts from 01 Apr 2019 whereas billing cycle starts from 31st of one month to 31st of every next month. Thus, procedure for data apportioning is not required for this monitoring period.

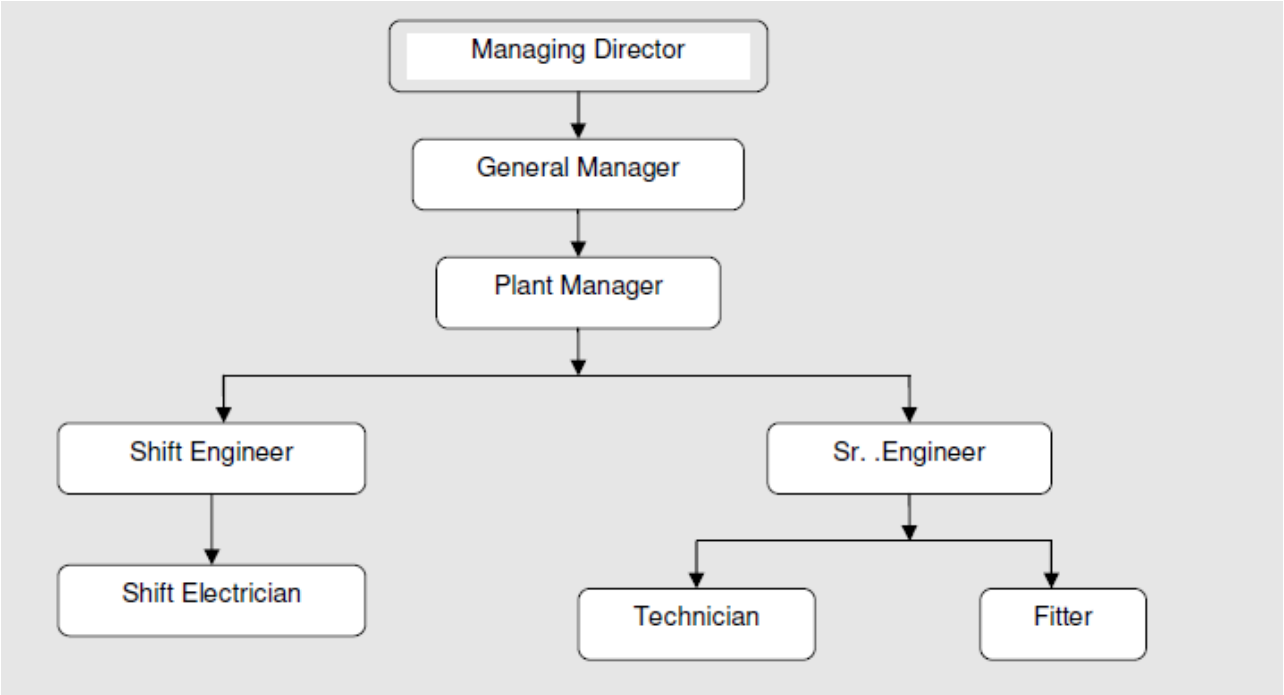
Interruption:

Numbers of interruptions hours (tripping / shutdowns) in generation during the shifts have been recorded in the logbooks at the plant.

The detail of the number of interruptions hours is given in table below:

Sr. No.	Month	Tripping Details in hrs		Interruption on account in hrs			
		Unit-1	Unit-2	AHPL		MPSEB	
				Unit-1	Unit-2	Unit-1	Unit-2
1	Apr-19	1.43	1.37	0	0	1.43	1.37
2	May-19	2.57	2.41	0	0	2.57	2.41
3	Jun-19	6.97	4.54	0.20	0.63	6.77	3.91
4	Jul-19	72.94	2.67	0	0.75	72.94	1.92
5	Aug-19	241.23	68.34	0	0	241.23	68.34
6	Sep-19	158.56	7.76	1.41	0	157.15	7.76
7	Oct-19	743.54	633.59	0	0	743.54	633.59
8	Nov-19	610.21	641.82	0	0	610.21	641.82
9	Dec-19	419.42	105.27	0	0.60	419.42	104.67
10	Jan-20	399.34	30.34	0	0	399.34	30.34
11	Feb-20	6.22	6.11	0	0	6.22	6.11
12	Mar-20	485.75	23.61	0	0	485.75	23.61
13	Apr-20	69.49	27.65	0	0	69.49	27.65
14	May-20	15.79	15.70	0	0	15.79	15.70
15	Jun-20	78.67	9.28	0	0.75	78.67	8.53
16	Jul-20	72.94	2.67	0	0.75	72.94	1.92
17	Aug-20	241.23	68.34	0	0	241.23	68.34
18	Sep-20	158.56	7.76	1.41	0	157.15	7.76
19	Oct-20	66.49	3.87	63.50	0.75	2.99	3.12
20	Nov-20	174.30	1.14	2.16	0	172.14	1.14
21	Dec-20	1.69	1.75	0.08	0	1.61	1.75

Organization structure:



Managing Director of AHPL is based in head office in Pune and makes a periodical visit to the Birsinghpur plant. The Plant Manager is in charge of day-to-day operations of the plant. Shift engineers, assisted by a fitter and a technician would be responsible for onsite maintenance of the equipment, preventive maintenance etc. The technicians will record the readings from main and check meters daily and these readings will be counter checked by the Plant Manager. Daily records at the storage tanks are maintained in the logbook to derive the quantity of diesel consumed. Daily reports are sent to head office electronically and Monthly reports are generated and maintained at the plant and head office. Plant managers would maintain records of joint meter reading and also the calibration testing records of the energy meter.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	EF
Unit	tCO_2/MWh
Description	Combined Margin CO_2 Emission Factor of the NEWNE regional grid
Source of data	CO_2 baseline database for the Indian Power Sector, Version 09, Dated 27 January 2014 – Central Electricity Authority (CEA), Ministry of Power
Value(s) applied	0.9699
Choice of data or measurement methods and procedures	CEA has estimated the simple operating margin and build margin emission factor for the NEWNE regional grid. For calculating the CO_2 emission factor as per combined margin method for the renewable power generation project activities in the first and subsequent crediting periods, the weights of 0.25 for operating margin and 0.75 for build margin have been considered as - "Tool to calculate the emission factor for an electricity system" (Version 04)
Purpose of data/parameter	Calculation of baseline emission.
Additional comments	The emission factor has been fixed for the 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 in year y
Measured/calculated/ Default	Measured
Source of data	Joint Meter Readings (JMRs)
Value(s) of monitored parameter	19,646.971
Monitoring equipment	Type of monitoring equipment: Electronic tri-vector meter Accuracy class: 0.2% Meter Calibration Details provided in Appendix 2
Measuring/reading/recording frequency	Continuous monitoring, hourly measurement and at least monthly recording
Calculation method (if applicable)	Not applicable
QA/QC procedures	Main and check meters are tested once in a year by the representative appointed by MPPKVVCL or third party authorized by the grid authority. The data will be cross checked with the invoice and bank statement.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	The data would be archived up to two years after the end of crediting period.

Data/Parameter	NCV_{diesel}
Unit	GJ/Ton
Description	Net calorific value of diesel used on standby DG set
Measured/calculated/ Default	Default

Source of data	CO_2 baseline database for the Indian Power Sector, Version 09, January 2014 Central Electricity Authority (CEA), Ministry of Power (http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)
Value(s) of monitored parameter	41.76
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Once in a Year
Calculation method (if applicable)	CO_2 baseline database gives Gross Calorific Value (GCV) which is converted to NCV by deducting 5% on account of latent heat of vaporisation of water, as per IPCC guidelines 2006.
QA/QC procedures	Calorific value will be sourced from the central electricity database once in a year
Purpose of data/parameter	Calculation of project emission
Additional comments	--

Data/Parameter	EF_{CO2_diesel}
Unit	tCO_2e/GJ
Description	CO_2 emission factor of diesel
Measured/calculated/ default	Default
Source of data	CO2 baseline database for the Indian Power Sector, Version 09, January 2014 Central Electricity Authority (CEA), Ministry of Power (http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)
Value(s) of monitored parameter	0.0726
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Review appropriateness of the values annually
Calculation method (if applicable)	Not Applicable as it is default value
QA/QC procedures	Emission factor will be sourced from the database once in a year
Purpose of data/parameter	Calculation of project emission
Additional comments	The emission factor in CO2 baseline database by CEA is sourced from IPCC guidelines 2006.

Data/Parameter	DC_y
Unit	Litres
Description	Diesel consumption by the standby DG set
Measured/calculated/ default	Measured
Source of data	Logbook
Value(s) of monitored parameter	82
Monitoring equipment	NA
Measuring/reading/recording frequency	Daily Recording

Calculation method (if applicable)	1) The diesel quantity available in diesel storage tank is measured using a scale and recorded on daily basis in logbook by AHPL. 2) The diesel consumption would be recorded in the logbook in liters. The values will be converted to tons using a factor 0.86 kg/liters (density of diesel), IPCC 2006 default values, for the purpose of calculation. 3) The diesel will be consumed only in the rare situation only when the power plant is not operational. 4) This value is used for project emission calculation.
QA/QC procedures	The measured data will be cross checked with diesel procurement.
Purpose of data/parameter	Calculation of project emission.
Additional comments	Project emissions due to diesel consumption will be calculated as below: $PE_{DC,y} = DC_y \times NCV_{diesel} \times EF_{CO2\_diesel}$ 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

>>

The procedures and formulas used for estimation of the baseline emission factor and the assumptions made have been detailed below.

The emission reduction of the small scale project activity is the net electricity exported to the grid ($EG_{BL,y}$) in MWh multiplied by the baseline emission factor in tCO_2e/MWh.

The combined margin emission factor has been derived from the simple operating margin and build margin emission factors after considering/ factoring the weights of 0.25 and 0.75 for operating margin (OM) and build margin (BM) emission factors respectively relevant to the hydro power generation project activities as per the "Tool to calculate the emission factor for an electricity system (Version 04)".

Combined Margin (CM) in tCO_2/MWh for NEWNE regional grid is

EF = 0.25 × Average of OM for last 3 years + 0.75 × BM

= 0.25 × 0.9776 + 0.75 × 0.9673

= 0.9699 tCO_2/MWh

Hence combined margin emission factor for the NEWNE grid (EF) is 0.9699 tCO2/MWh

BE_y = $EG_{BL,y}$ × EF

= 19,646.971 × 0.9699 = 19,055.383

= 19,055 tCO_2e (rounded down value)

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} = $\sum DC_y \times Density_{Diesel} \times NCV_{Diesel} \times EF_{CO2\_diesel}$

Where,

PE_{Diesel} = project emission due to diesel consumed during this monitoring period in DG set
DCy = diesel consumption in Liters (L)
$Density_{Diesel}$ = density of diesel (0.86Kg/Lit)
NCV_{Diesel} = net calorific value of diesel
EF_{CO2_diesel} = IPCC 2006 emission factor for diesel

Thus,

PE_{Diesel} = 82 L × (0.86 × 10^-3) tonne/L × 41.76 GJ/tonne × 0.0726 tCO_2e /GJ

= 0.214 tCO_2e

= 1 tCO_2e (rounded up value has been considered)

E.3. Calculation of leakage emissions

>>

Not Applicable. According to the AMS-I.D., para 42, guidance on leakage is provided for biomass project only but the project activity is first of its kind small hydro project. Hence, no leakage emission from this project activity has been considered.

Hence, $LE_y = 0$

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

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
Total	19,055	1	0	0	19,054	0	19,054

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

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
19,054	25,034

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

>>

As per registered CDM-PDD (version 06.2, dated: 10/01/2015) page 1, the annual estimated volume of CERs is 14,255 tCO_2e. The total nos. of days included in this monitoring period (i.e. 01/04/2019 to 31/12/2020, inclusive of both the days) = 641. 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. 641 days, which results in 25,034[10] tCO_2e. Whereas actual ER achieved is 19,054 tCO_2e. The detailed calculation has been provided in ER calculation sheet.

E.6. Remarks on increase in achieved emission reductions

>>

There is no increase in emission reductions achieved.

As per section E.5., it is evident that the actual emission reductions achieved during the current monitoring period is less as compared to that of projected emission reduction for the comparable period as per registered PDD. There is around 23.86% lesser emission reduction achieved during the current monitoring period as compared to the projected ERs of equivalent period.

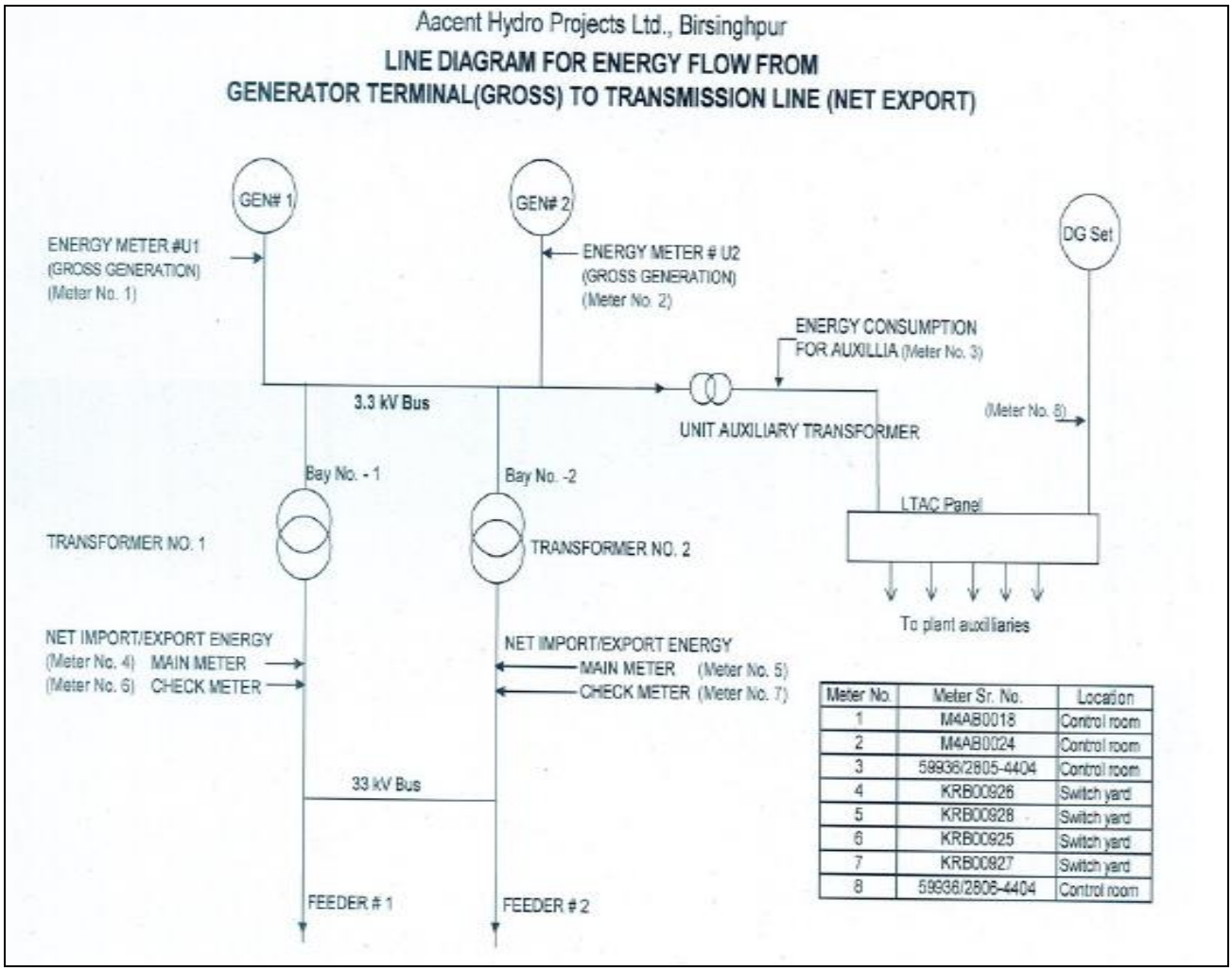
[10] Ex-ante estimated annual ER as per registered PDD = 14,255; = 14,255/365 = 39 tCO_2e per day.
Ex-ante estimated value corresponds to this monitoring period = 39 × 641 = 25,034 tCO_{2e}.

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

>>

The project activity is a Type-I category small scale (2.2 MW) hydroelectric project at Birsinghpur in Madhya Pradesh 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.

Appendix - 1



Meter No.	Meter Sr. No.	Location
1	M4AB0018	Control room
2	M4AB0024	Control room
3	59936/2805-4404	Control room
4	KRB00926	Switch yard
5	KRB00928	Switch yard
6	KRB00925	Switch yard
7	KRB00927	Switch yard
8	59936/2806-4404	Control room

Appendix - 2

Details of Energy Meters & their calibration due dates:

Calibrated Energy Meter	Make	New Meter Type	Accuracy Class	Calibration Date	Valid till	Meter Calibration Date
D1175012 Main Meter Bay-1	Secure	E3M024	0.2s	4-Oct-18	4-Oct-19	10-Oct-19
D1175014 Main Meter Bay-2	Secure	E3M024	0.2s	4-Oct-18	4-Oct-19	10-Oct-19
D1175013 Check Meter Bay-1	Secure	E3M024	0.2s	4-Oct-18	4-Oct-19	10-Oct-19
D1175015 Check Meter Bay-2	Secure	E3M024	0.2s	4-Oct-18	4-Oct-19	10-Oct-19

Please note that meter calibration & replacement is solely under purview of MPPKVVCL, PP has no control over it. However, it is noted that there is a delay of 6 days in meter calibration as calibration had happened on 10 Oct 2019 whereas validity date of previous calibration was till 04 Oct 2019. However, the source document for net electricity delivered i.e., JMR provides monthly value and applying maximum permissible error factor for 6 days in Oct 2019 requires apportioning of monthly electricity values. Therefore, PP has followed the conservative approach and applied maximum permissible error for the whole month of Oct 2019 for the conservative estimation of emission reduction.

Also, it is to be noted that calibration due date after the last calibration was 10 Oct 2020. Due to COVID-19 pandemic that whole world is facing MPPKVVCL could not arrange to conduct calibration of meters on due date and it is still pending. PP is following up with MPPKVVCL on continuous basis and hoping to get it done as early as possible. Therefore, PP has followed the conservative approach and applied maximum permissible error for the whole month of Oct 2020, Nov 2020 and Dec 2020 for the conservative estimation of emission reduction.

Detailed calculation is provided in Emission Reduction (ER Sheet) calculation excel sheet.

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Document information

Version	*Date*	*Description*
08.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • 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: • 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: • 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: • 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 *F-CDM-MR* to *CDM-MR-FORM*; • 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.

Version	*Date*	*Description*
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.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report