 Monitoring report form for CDM project activity (Version 09.0)			
MONITORING REPORT			
Title of the project activity	10 MW Manjanadka Hydro Project, Karnataka, India		
UNFCCC reference number of the project activity	9467 ¹		
Version number of the PDD applicable to this monitoring report	01.1		
Version number of this monitoring report	01		
Completion date of this monitoring report	16/03/2022		
Monitoring period number	02		
Duration of this monitoring period	01/01/2020 to 31/12/2020 (both first and last dates are included)		
Monitoring report number for this monitoring period	Not Applicable		
Project participants	M/s Boruka Power Corporation Limited		
Host Party	India		
Applied methodologies and standardized baselines	AMS I.D. Ver.17- Grid connected renewable electricity generation Standardized baseline : NA		
Sectoral scopes	01 : Energy industries (renewable -/ non-renewable)		
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
	0 tCO ₂	6,348 tCO ₂	0 tCO ₂
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	29,655 tCO ₂		

¹ <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1356932785.14/view>

SECTION A. Description of project activity

A.1. General description of project activity

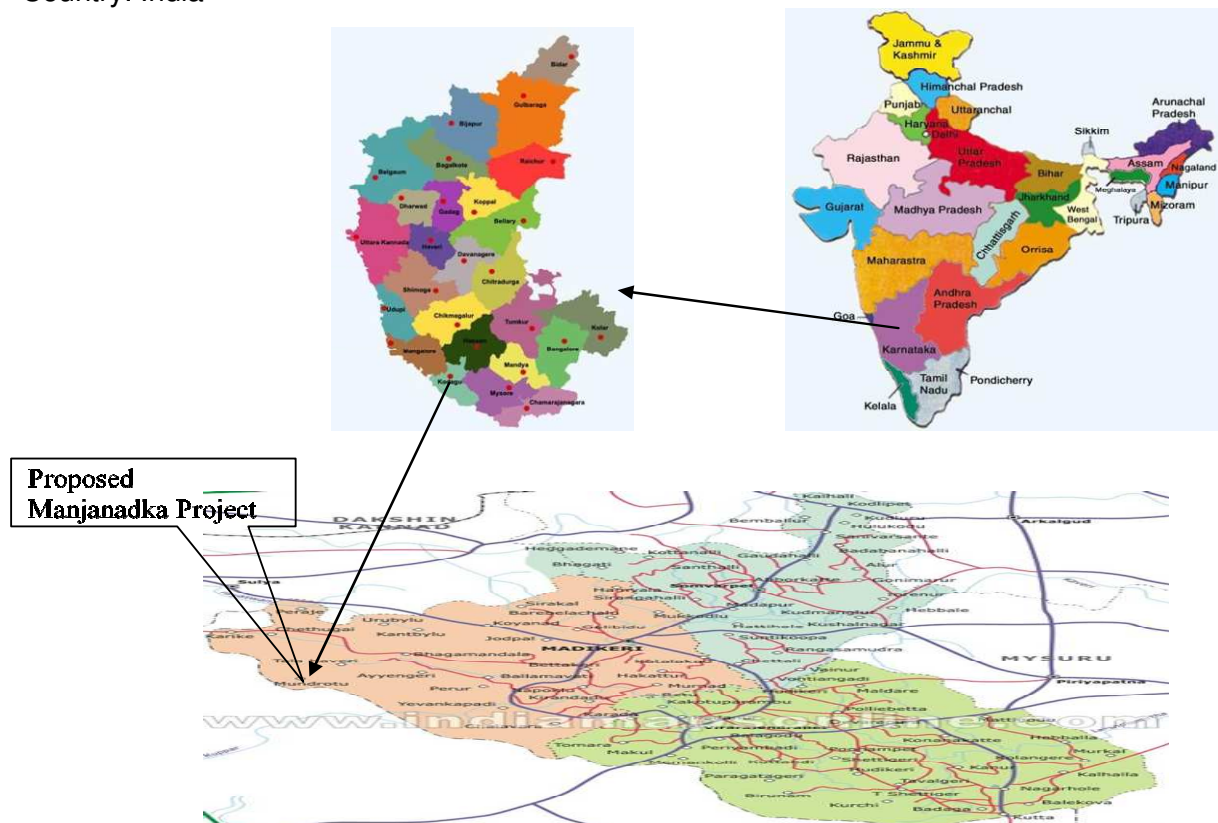
The purpose of the project activity is to generate green electricity utilizing the natural available water resources in the state of Karnataka (India). The power generation has been achieved by installing two 5 MW horizontal Francis turbines. The project envisages the utilization of flows in the Manjanadka River and a gross head of about 50 meters at the location of the proposed project. The river, over a length of about 2 kilometers upstream of road-bridge near Chettugai village, has many rapids resulting in a total head of about 50 meters which is utilized advantageously to generate power. The annual energy produced by the project activity is estimated to be 37.2 GWh. The total annual energy available after accounting for station auxiliary consumption, transformer losses, transmission line losses and grid outages is estimated to be 35.18 GWh.

The project activity is located in the state of Karnataka, India. Karnataka is bestowed with a rich potential for development of 7,500 MW of hydroelectric projects, of which only 2,755 MW constituting about 36.75% of the potential has been exploited. It is estimated that 800 MW of small hydro power potential can be exploited in the state. The Government has encouraged private sector participation in small power projects.

India has an aggregate capacity of over 1,423 MW of small hydro projects (up to 25 MW) , which is only 1.05% of the total installed capacity. The Government of India plans to add another 1,400 MW of small hydro power by the end of the 11 five year plan (2007-2012). In the 11 plan the share of hydro power to be met through the private sector alone is 3,263 MW. The project activity contributes to meeting some of this target.

A.2. Location of project activity

Village: Chetugai
 District: Kodagu
 State: Karnataka
 Country: India



Manjanadka River is one of the many west flowing streams of Karnataka. The stream, which originates in the Brahmagiri hill ranges of the Western Ghats near Bhagamandala, traverses through Karnataka and Kerela and joins Payaswini river, which empties into Arabian sea near Kasargod. The proposed hydel scheme is just upstream of the bridge on the Bhagamandala Karike road across Manjanadka river. The site is about 22 km from Bhagamandala, and 55 km from the district town of Madikere. The project site is about 300 km from Bangalore.

Latitude : 12° 26' 40" N Longitude : 75° 25' 9" E

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host Party)	M/s Bhoruka Power Corporation Limited (Private entity)	No

A.4. References to applied methodologies and standardized baselines

Title: Type I, Renewable Energy projects,

Reference: AMS I.D, Grid connected renewable electricity generation- Version 17²

Reference: Appendix B of the simplified modalities and procedures for small-scale CDM project activities – Indicative Simplified Baseline and Monitoring Methodologies for selected small-scale CDM project activity categories, Version 17: EB 61.

The CDM-SSC-PDD has also referred to the methodological tool – „Tool to calculate the emission factor for an electricity system“ (Version 02.2.1), EB-63, Annex-19³

A.5. Crediting period type and duration

Type: Fixed Crediting Period

Duration: 01/01/2013 - 31/12/2022 (10 years 00 months)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The technology employed for power generation in the small scale project activity involves the conversion of potential energy available in the water flow into mechanical energy using hydro turbines and then into electric energy using alternators. The generated power is evacuated to KPTCL's existing sub station at Sulya by a 17.5 km long double circuit 33 kV transmission line.

Two horizontal Francis turbines of 5 MW each are used for power generation. The type of turbine is of horizontal shaft Francis type directly coupled to the Horizontal synchronous generator. The turbine is with adjustable guide vanes for control of the flow. The guide vanes are actuated by the guide vane servomotor through the governor. The main parameters of the proposed turbine are furnished below:

² <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

³ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.2.1.pdf>

Turbines	
Rated Capacity	5000 k W
Rated Flow	12.25m ³ / sec
Rated head	47 m
Runner diameter	1325mm
Rated speed	428rpm

The synchronous generators will be 5 MW, 11 kV, 3 phase 0.85 PF (lag), 50 Hz with static or brushless excitation system, suitable for parallel operation with the KTPCL grid. The speed of the generator was decided by the vendor to provide the most economical and optimum design to match the turbine speed. The generator winding is class F insulation with temperature rise limited to class B and is star connected. The generator neutral is earthed through neutral grounding transformer with secondary resistance. The details of the generators and the hydrology are given below:

Generators	
Number	2
Type	Horizontal Synchronous
Rated output	5000 kW
Generation voltage	11 kV

Hydrology	
Catchment area	45 Sq. km (up to Diversion Weir)
Average annual Rainfall	5269 mm
Design Peak Flood	750 m ³ /second (estimated)

Evacuation of Power Gene rated

It evacuates the power generated at Manjanadka Mini Hydel Scheme to the existing 33/11 kV substation at Sulya by using two step-up transformers and a double circuit 33 kV transmission line. The route length of the transmission line is about 17.5 km.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

There are no temporary deviations from the registered monitoring plan, the applied methodologies, the applied standardized baselines or the other applied methodological regulatory documents during this monitoring period. Hence, Not Applicable

B.2.2. Corrections

There are no corrections to project information or parameters fixed at the registration or renewal of crediting period of the project activity. Hence, Not Applicable

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

There is no request for the change to the start date of the crediting period.

B.2.4. Inclusion of monitoring plan

There is no post-registration change to include a monitoring plan into the PDD.

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

There are no any permanent changes from registered monitoring plan or applied methodology.

B.2.6. Changes to project design

There are no changes to project design of registered project activity.

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

Not applicable as this project activity is not afforestation or reforestation project activity.

SECTION C. Description of monitoring system

The energy exported by Boruka Power is recorded from independent Main meter installed at Pilakala substation. In the event, the Main meter is not in operation, and the reading from Check meter is used for billing.

The calibration of monitoring equipment is being maintained as per the requirement of KPTCL and the same is being done regularly. Electricity export to grid & electricity import from grid is being recorded daily and the same is being verified by the plant incharge.

MONITORING ORGANISATION STRUCTURE

The company Boruka Power Corporation Ltd. is managed by a Board of Directors. The company is managed professionally with a full time Managing Director. He is assisted by Sr.Vice President (Technical), who is in charge of all technical aspects, and a Vice President(Finance), Sr.Vice President (Technical), responsible for all projects, has under him a Deputy General Manger (O&M), who is responsible for operation & maintenance of all the running plants. He inturn is assisted by Plant Manager for each of the Hydro Plants. The Plant Manager is assisted by engineers/Asst. Managers for each activity of operation & maintenance in the respective plant.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data of the CDM activity rests with Sr.Vice President (Technical), For monitoring activities of GHG and preparation of necessary reports, for review by the management, the responsibilities rest with concerned plant manager.

The responsibility of storage and archiving of information in good condition also lies with Plant Manager. Sr.Vice President (Technical) undertakes periodic verification and onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions.

The readings from energy meters (ie, Electricity supplied to the grid (EG_y), electricity export by the project $EG_{\text{export}, y}$ & Grid electricity import to the project activity ($EG_{\text{import}, y}$) is being taken on an daily basis by the shift supervisor and recorded in logbooks. This daily data is being signed off at the end of every subsequent day by the shift in charge/ power plant manager.

Energy meters are calibrated every quarter and sealed as per the PPA, Hence, high quality is ensured for all the above parameters. Generated energy is fed in to the Grid by two lines. Hence for measurement purpose there are total two main meters and two check meters for two lines.

The Power Purchase Agreement signed by the Project Participants and the KPTCL provides procedures for monitoring the energy fed to the grid, emergency preparedness, calibration of monitoring equipment, company's operation and maintenance responsibilities etc. These parameters are regularly reviewed. Hence, no separate procedures for QA/QC are provided in this monitoring plan.

The project has necessary provisions for emergency preparedness so that any unforeseen events such as fire etc. could be averted. The provisions include fire fighting systems, standby features for critical items etc.

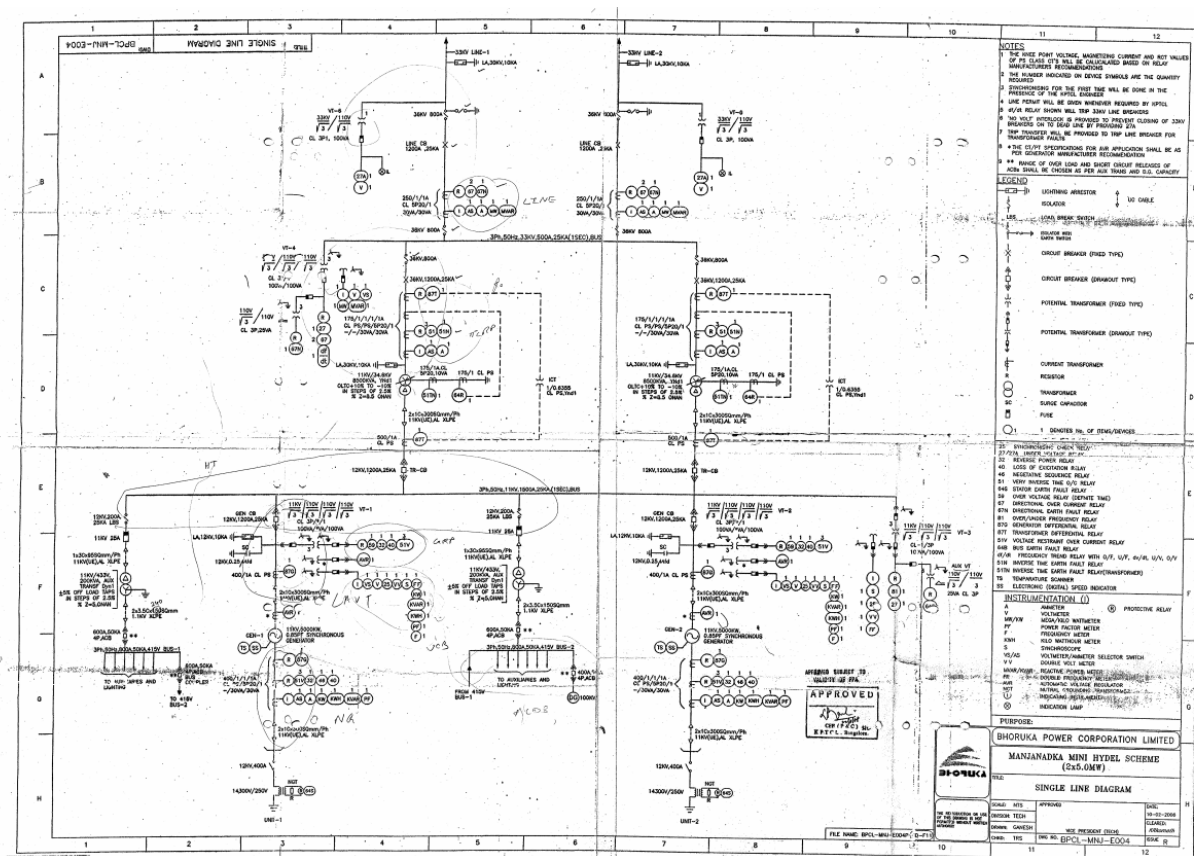
All the data monitored under the monitoring plan is being kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later. The monitored data has been presented to the DOE to whom verification of emission reductions is assigned.

The Company, as corporate policy, delegated and upgraded the responsibilities of various functional heads. These revisions are updated in the ISO procedures.

MONITORING INFORMATION

All the parameters mentioned in the monitoring plan are being maintained at the plant. The entire process of monitoring is made available in the required format during the verification process and for subsequent useful purposes. The calibration of monitoring equipment is being maintained as per the requirement of KPTCL and the same is being done regularly.

Single line Diagram of the project activity:



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 emission factor for Southern Grid (Now as INDIAN Grid)
Source of data	CO ₂ Baseline Database version 07.0 published by CEA
Value(s) applied	0.8429

Choice of data or measurement methods and procedures	The fixed ex-ante combined margin emission factor is used in the calculation of emission reductions. The combined margin has been calculated as per "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) with 3 years vintage data of simple OM and recent data of BM. The calculation is based on 50% of OM and 50% of BM values approach.
Purpose of data/parameter	To calculate the baseline emission
Additional comments	As the calculation of Combined margin emission factor has been done and fixed ex ante its value will remain fixed for the entire crediting period. Data will be archived for crediting period+2 years.

Data/Parameter	EF_{OM,y}
Unit	tCO ₂ /MWh
Description	CO ₂ Operating margin emission factor of the grid
Source of data	CO ₂ Baseline Database version 07.0 published by CEA
Value(s) applied	0.9521
Choice of data or measurement methods and procedures	The value applied is taken from the latest CEA database and EF _{OM} is calculated for <i>ex - ante</i> baseline emission calculation
Purpose of data/parameter	To calculate the baseline emission
Additional comments	As the calculation of operating margin emission factor has been done and fixed ex ante its value will remain fixed for the entire crediting period. Data will be archived for crediting period+2 years.

Data/Parameter	EF_{BM,y}
Unit	tCO ₂ /MWh
Description	CO ₂ Build margin emission factor of the grid
Source of data	CO ₂ Baseline Database version 07.0 published by CEA
Value(s) applied	0.7338
Choice of data or measurement methods and procedures	The value applied is taken from the latest CEA database and EF _{BM,y} is calculated for <i>ex- ante</i> baseline emission calculation.
Purpose of data/parameter	To calculate the combined margin
Additional comments	As the estimation of build margin emission factor has been done and fixed ex ante its value will remain fixed for the entire crediting period. Data will be archived for crediting period+2 years.

D.2. Data and parameters monitored

Data/Parameter	EG_{export,y}
Unit	GWh
Description	Electricity exported to the grid by the project during the year y
Measured/calculated/default	Measured
Source of data	Joint Meter Reading (Form-B)
Value(s) of monitored parameter	10.70
Monitoring equipment	Energy Meter
Measuring/reading/recording frequency	Monthly
Calculation method (if applicable)	Electric power exported to the grid is measured by both the main and check meters in presence of BPCL and KPTCL representative as specified in the PPA and records maintained. There are total two main meters and two check meters installed at Sulya substation. This is because power evacuation is by double circuit transmission lines connected between power house and Sulya substation. However, each line is required to have one main and one check

	meter.
QA/QC procedures	Meters are calibrated every calendar quarter as per Power purchase agreement.
Purpose of data/parameter	To calculate the baseline emission
Additional comments	Electric power sold to the grid will be measured by main meter and check meter by both BPCL and KPTCL as specified in the PPA and records maintained. To be cross-checked with monthly invoices or receipts of payments. Data will be archived for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later

Data/Parameter	EG_{import,y}
Unit	GWh
Description	Electricity import to the project activity during the year y
Measured/calculated/default	Measured
Source of data	Joint Meter Reading
Value(s) of monitored parameter	0.07
Monitoring equipment	Energy Meter
Measuring/reading/recording frequency	Monthly
Calculation method (if applicable)	Electric power import from the grid is measured by both the main and check meters in presence of BPCL and KPTCL representative as specified in the PPA and records maintained. The same meter that measures electricity export to the grid (EG _{export,y}) also measures electricity import (EG _{import,y}). There are total two main meters and two check meters. This is because power evacuation is by two lines and each line is required to have one main and one check meter.
QA/QC procedures	Meters are calibrated every calendar quarter as per Power Purchase Agreement (PPA).
Purpose of data/parameter	To calculate the baseline emission
Additional comments	All the data monitored under the monitoring plan will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later.

Data/Parameter	EG_y
Unit	GWh
Description	Net electricity supplied to the grid by the project
Measured/calculated/default	Calculated
Source of data	Joint Meter Reading (Form-B)
Value(s) of monitored parameter	7.53
Monitoring equipment	Energy Meter
Measuring/reading/recording frequency	Monthly
Calculation method (if applicable)	Net electricity is determined by the State electricity utility by subtracting the values of EG _{export,y} and EG _{import,y}); and is being sourced from the Form-B. EG _y =Electricity exported to the grid by the project during the year y (EG _{export,y}) - Electricity import to the project activity during the year y (EG _{import,y})
QA/QC procedures	Sales record can be used to cross check
Purpose of data/parameter	To calculate the baseline emission

Additional comments	All the data monitored under the monitoring plan will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later
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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**

As the project activity does not modify or retrofit an existing electricity generation facility, the baseline scenario is electricity delivered to the grid by the project that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The baseline emissions are calculated based on the net energy provided to the grid (in GWh/year), and an emission factor for the displaced grid electricity (in tCO₂/GWh).

$$BE_y = EG_y * EF_{CO_2, Grid, y}$$

where,

EG_y = the net electricity exported to the grid system during the year y

$EF_{CO_2, Grid, y}$ = the emission factor of the grid to which the project exports electricity

Therefore, Baseline Emission, $BE_y = 7.53 \text{ GWh} * 842.9 \text{ tCO}_2/\text{GWh}$
 $= 6,348 \text{ tCO}_2$ (Round down value)

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

There is no project activity emissions associated with the project activity. However, the same shall be monitored in the case fossil fuel is used.

Since no fossil fuel is used during the monitoring period therefore project emission is nil.

E.3. Calculation of leakage emissions

There is no leakage associated with the project activity.

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

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
Total	6,348	0	0	0	6,348	0	6,348

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 ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
6,348	29,655

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

The annual average ex ante emission reductions as per the registered PDD is 29,655 tCO_{2e}. , The estimated ex-ante emission reduction for the period 01/01/2020 to 31/12/2020 of 29,655 tCO_{2e} is estimated based on 365 days of operation. . Since year 2020 is leap year, therefore estimation of actual emission reduction is based on 366 days of power plant operation so the ER amount (ex-ante) for the monitoring period estimates to 29,736 tCO_{2e}. The detailed calculation can be referred from the emission reduction sheet.

E.6. Remarks on increase in achieved emission reductions

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 29,655 tCO_{2e}, whereas actual emission reductions achieved are 6,348 tCO_{2e}, which is 78.6% lower than the estimated emission reductions. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant. The lower generation during the current verification period is hence due to certain natural conditions and hence acceptable.

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

Since the capacity of the project activity is 10 MW, hence the project remains a small-scale project activity as per the small scale activity Project Type (Type I: Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent)).

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	8 October 2021	Revision to: <ul style="list-style-type: none"> Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).
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.

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