Monitoring report form for CDM project activity
(Version 07.0)

MONITORING REPORT		
Title of the project activity	Thangarabalu Small Hydel Project at Karnataka	
UNFCCC reference number of the project activity	9592[1]	
Version number of the PDD applicable to this monitoring report	3.1	
Version number of this monitoring report	01	
Completion date of this monitoring report	25/10/2020	
Monitoring period number	01	
Duration of this monitoring period	01/04/2015 to 31/12/2017 (Inclusive of both dates)	
Monitoring report number for this monitoring period	NA	
Project participants	Kare Power Resources Private Limited. (KPRPL)	
Host Party	India	
Applied methodologies and standardized baselines	Methodology:ACM0002 ver. 13[2] – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Standardized Baseline: NA	
Sectoral scopes	1 : 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
	0 tCO_2e	58,186 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	148,786 tCO_2e	

[1] https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1362387829.2/view

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

SECTION A. Description of project activity

A.1. General description of project activity

The project activity, promoted Kare Power Resources Private Limited (KPRPL), is a run-of-river 24.75 MW (2 * 12.375 MW) hydro power project across the river Krishna – approximately 13 km downstream the river Krishna at Yalagundhi Village, Lingasugur Taluk, Raichur district, Karnataka, India.

The purpose of the project activity is to utilize the potential energy available in flowing water for power generation and promote sustainable development in the region. The process involves converting kinetic energy available in the water flow into mechanical energy using hydro turbines and then to electrical energy using alternators. The project is estimated to generate 65 Million kWh of power annually.

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. As the project is a Greenfield project activity, the baseline scenario is the same as the scenario existing prior to the start of the project activity i.e. the electricity demand was met by the power plants already operating in the grid (dominated by fossil fuel based power plants) and planned to be added to the grid. Thus the project would lead to on an average the displacement of 53,983 tCO_2e emissions annually and would lead to 539,830 tCO_2e over the entire crediting period. There were no event occurred that could alter the project design and methodology applicability during the current monitoring period.

For the current monitoring period 01/04/2015 to 31/12/2017 (inclusive of both days), the total GHG emission reduction achieved are 58,186 tCO2e by supplying net electricity of 69,069.99 MWh.

A.2. Location of project activity

Host Party : India
Region/State/Province : Karnataka
District : Raichur
Taluk : Lingasugur
Village : Yalagundhi

Physical/Geographical location:

Latitude : 16° 16’ 33” N
Longitude : 76° 28’ 08” E

The project activity is located across the river Krishna – approximately 13 km downstream of Narayanpura dam near Yalagundhi Village, Lingasugur Taluk, Raichur district, Karnataka, India. The project is at a distance of about 120 km from the nearest district town of Raichur, which is the nearest important railhead and can be reached via Lingsugur.

The location of the project site is illustrated below:

Figure 1. Map of India pointing project location

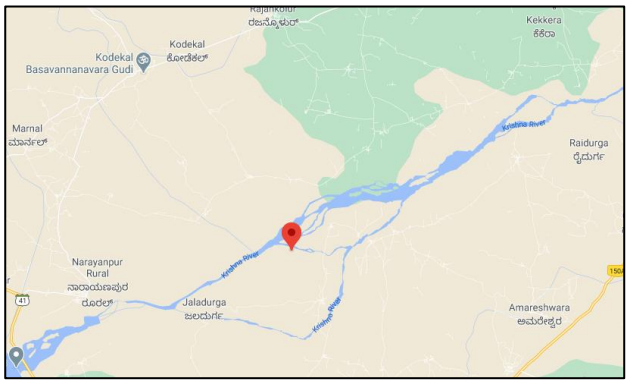


Figure 2. Project Map View 1

Figure 3. Project Map View 2

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 (host Party)	Kare Power Resources Private Limited (Private Entity)	No

A.4. References to applied methodologies and standardized baselines

Sectoral Scope : 01-Energy industries (renewable / non-renewable sources)
Methodology : ACM0002: "Grid-connected electricity generation from renewable sources", Version 13.0.0 (EB 67)[3]
Project Type : I- Renewable energy projects

[3] https://cdm.unfccc.int/UserManagement/FileStorage/DYPFI935XBG274NWH6O8CM1KEZR0VU

The Tools Used Tool to calculate the emission factor for an electricity system. Version 3.0.0/EB 70 annex 22[4]

A.5. Crediting period type and duration

Type	- Fixed
Monitoring Period Number	- 01
Duration of Crediting Period	- 01/04/2015 to 31/03/2025
Current Monitoring Period	- 01/04/2015 to 31/12/2017 (inclusive of both days)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The project having 2 no. x 12.375 MW (24.75 MW) turbine-generator configuration. The type of turbine used is vertical shaft full Kaplan type with adjustable guide vanes and adjustable runner blades. The main features of the project are provided below:

Turbine	**Parameters**
Rated flow	65 m^3/s
Rated net head	25m
Runner diameter	3100 mm
Rated Speed	214.3 rpm
Diversion Structure	**Parameters**
Length (overflow portion)	400
River bed Level	RL 402.00 m
Crest Level of diversion structure	RL 424.00 m
Normal pond level	RL 424.00 m
Scouring Sluice Size	1.2 m x 1.2 m (4 nos)
Power Canal	**Parameters**
Length	2100 (approx)
Type	Trapezoidal
Material	CC Lined
Design flow	160 m3/s
Base Width	16m
Bed Slope	1:2000
Forebay	**Parameters**
Maximum Width of Forebay	25 m
Length of forebay	150 m
Penstock	**Parameters**
Number	2
Material	Steel
Length	25 m
Internal Diameter	4.6 M
Power House	**Parameters**
Location	On right bank
Installed Capacity	24.74 W (12.375 X 2)
Powerhouse size	45 m X 28 m
Tail race channel	Length- 125 m Base width- 40 m

KPRPL installed two 11kV, 12.375 MW, 0.85 of synchronous generators. The generators are connected to 11kV indoor switchgear. The voltage is stepped up to 110 kV by means of one 36 MVA, 11/110 kV, 3 phase step-up transformer and power is evacuated to existing KPTCL 220/110 kV sub-station at Lingsugur. The project generates about 65 Million kWh of power annually operating

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf

at a capacity utilization factor of 30%. There is no transfer of technology proposed for the project activity. The project is fully commissioned on 16/09/2015.

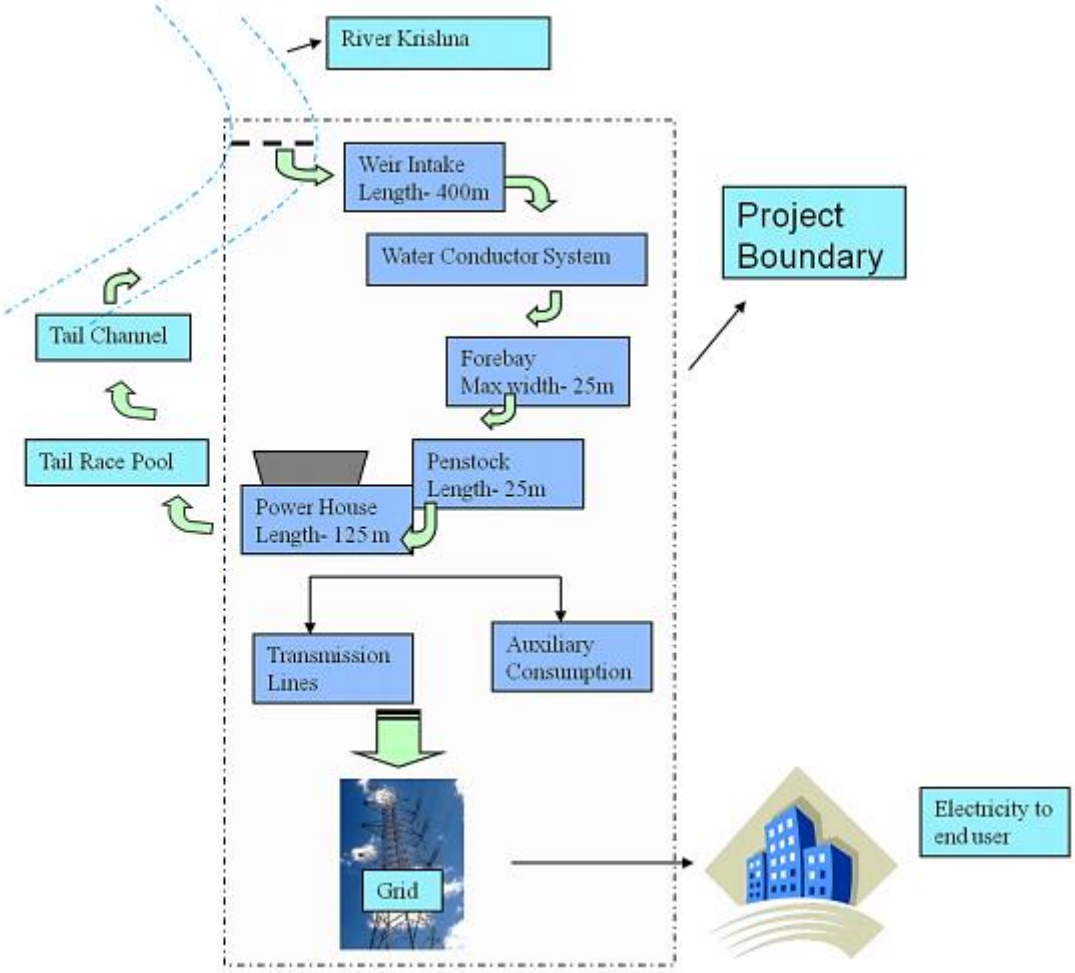


Figure 4. Project Boundary

B.2. Post-registration changes

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

Not Applicable

B.2.2. Corrections

Not Applicable

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

The crediting period has been changed. The previous crediting period was 01/04/2013 to 31/03/2023 which is now changed to 01/04/2015 to 31/03/2025[5].

The change is due to the delay in project implementation. At the time of validation of the project activity, it was expected that the project activity is commissioned on July 2013. However, there was a delay in supply of project equipment. Due to this delay, the project was commissioned only on 16/09/2015. Hence, the start date of the crediting period from 01/04/2013 to 01/04/2015.

The post registration changes for changes to start date of crediting period is approved on 31/01/2017. Please refer below web link for same
https://cdm.unfccc.int/PRCContainer/DB/prcp741147893/view

[5] https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1362387829.2/view

B.2.4. Inclusion of monitoring plan

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

Not Applicable

B.2.6. Changes to project design

There are no any changes to project design applied for current monitoring period.

The project applies following post registration changes and same are approved on 31/01/2017. Please refer below web link https://cdm.unfccc.int/PRCContainer/DB/prcp741147893/view

Change in the project design:
There are some minor changes in the technical specification of power plant & equipments which are listed below:

- Rated head of the turbine is changed from 22 m to 25 m
- Rated flow rate of the turbine is changed form 67 m^3/s to 65 m^3/s
- Scouring Sluice Size is changed from '2.5m X 4.0 m (2 Nos)' to '1.2 m x 1.2 m (4 nos)'
- Base width of power canal is changed from 15m to 16m

The technical specification in the registered PDD is based on the specification mentioned in the DPR. However, during the construction, these minor changes occurred to the project design. However, there is no change in the rated output capacity of the turbine. Moreover the changes do not make impact on the following:

a. The applicability and application of the applied methodology under which the project has been registered;
b. Compliance of the monitoring plan with the applied methodology;
c. The level of accuracy and completeness in the monitoring of the project activity;
d. The additionality of the project activity;
e. The scale of the project activity;

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

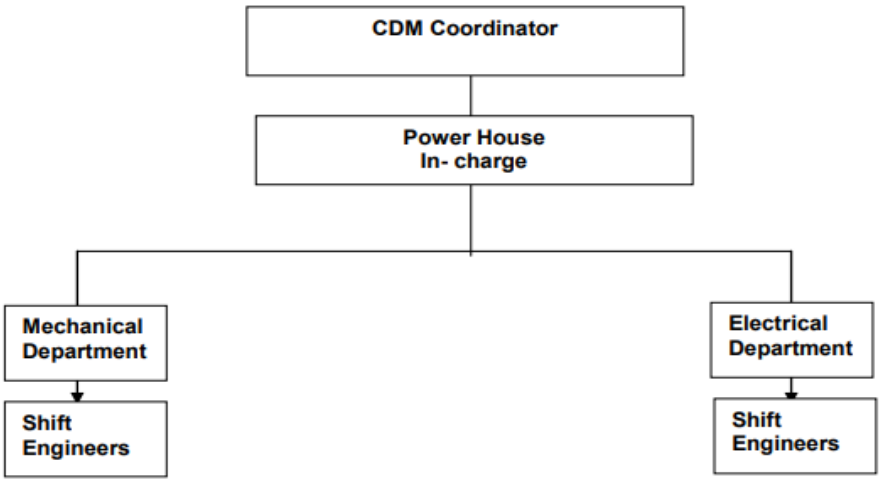
Not Applicable

SECTION C. Description of monitoring system

The monitoring plan is prepared in accordance with the methodology. The project proponent has a well-defined project management structure for monitoring the project activity. The monitoring methodology essentially aim at measuring and recording through devices, which enable verification of the emission reductions achieved by the project activity that qualifies as Certified Emission Reductions (CERs). The monitoring procedure for the project activity is given as follows:

Objective of Monitoring Procedure:
This procedure set guidelines for the project proponent to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the Monitoring team and procedures to be followed in monitoring of the CDM parameters.

CDM Team:
The CDM team comprises of personnel from the various departments at the plant. Operators from the mechanical and electrical divisions in the plant would report to respective (shift engineers) who in turn would report to the Plant Manager. The Plant Manager provide necessary inputs to the CDM Co-ordinator. The team is headed by GM (Projects). The organization structure of the CDM Team is given below.



Data Monitoring:
In order to ensure delivery of CERs, relevant data identified would be monitored.

Data to be monitored:

1. Electricity exported by project activity to the southern grid, EG_{export} Recorded Monthly
2. Electricity imported by project activity from the southern grid, EG_{import}. Recorded Monthly
3. Quantity of Diesel combusted in process j during the year y, $FC_{Diesel,j,y}$ Recorded when in use.

List of Monitoring Equipments

1. Check Meters located at KPTCL sub station
2. Main Meters located at KPTCL sub station
3. Tube Gauge Indicators located at the project site

Frequency of Monitoring and Recording

1. Electricity Exported to grid: Monthly. Meter readings will be recorded by KPTCL and Kare personnel in the KPTCL sub station on a monthly basis.
2. Electricity Imported from the grid: Monthly. Meter readings will be recorded by KPTCL and Kare personnel in the KPTCL sub station on a monthly basis.
3. Diesel Oil Consumption: Tube Gauge Indicator. When in use. Log books will be maintained to record quantity consumed. The daily report will be aggregated to arrive at monthly production and monthly report will be generated

The net electricity generated is a calculated value obtained by taking the difference in export and import values. The export and import values can be cross checked with the invoices raised to KPTCL.

The Joint Meter Readings are taken once a month in the presence of KPTCL and Kare personnel. This data can be used to raise an invoice to KPTCL.

Data Archiving:
Log sheets and the other records archiving would be done for crediting period plus two years.

Review Procedures & Frequency:
Plant Manager reviews the implementation of documented procedures and maintain necessary records. CDM Co-ordinator also review the procedures once a month for the first one year and once in three months thereafter. GM (Projects) would review once in six months.

Calibration Frequency:
Periodic calibration schedule which spreads over the year for all electrical, electronic and field instruments are prepared and maintained. As per the schedule, calibration of instruments and equipments would be carried out annually and recorded in calibration reports.

Meter Calibration table:

Meter Details	Sl. No. of Meters	Make of Meter	Accuracy Class	Calibration Date	Due date for next Calibration
Main Meter[6]	15192473	L & T	0.2 s	12-July-2015	11-Juy-2016
				08-August-2016	07-August-2017
				27-September-2017	26-September-2018
Check meter[7]	15192474	L & T	0.2 s	12-July-2015	11-July-2016
				08-August-2016	07-August-2017
				27-September-2017	26-September-2018

Quality Assurance:
All energy meters used would be electronic trivector meters of accuracy class 0.2%. Annual testing of all energy meters shall be carried out, with reference to a portable meter, for checking the accuracy, which shall be of accuracy class 0.1 %.

Check meters readings would be used, in case main meters fail. In case both main and check/backup meters are found to be beyond permissible limit or error, both the meters would be calibrated immediately and the correction applicable to main meter would be applied to the energy registered by the main meter at the correct energy for the purpose of energy account/billing for the actual period during which inaccurate measurement were made.

Emergency Preparedness:
No emergency situations, which can lead to unintended GHG emissions, are envisaged since there are no fuels involved in this project activity.

Uncertainties Related To GHG Emissions:
No uncertainties are envisaged / foreseen relating to GHG emission.

Training of personnel:
Employees would be trained in-house by Kare Power. Apart from this training, various member of the CDM team would be trained time to time according to the departmental needs.

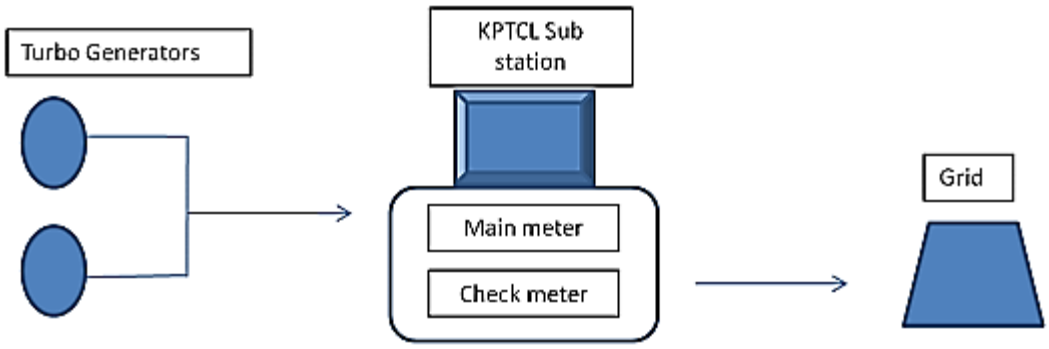


Figure 5. Energy Meter location

[6] Error factor has been applied to the generation values for the months of July-16 and Aug-16 due to delay in calibration during the year 2016. Error factor has also been applied to the generation values for the months of Aug-17 and Sep-17 due to delay in calibration during the year 2017.

[7] Error factor has been applied to the generation values for the months of July-16 and Aug-16 due to delay in calibration during the year 2016. Error factor has also been applied to the generation values for the months of Aug-17 and Sep-17 due to delay in calibration during the year 2017.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid, OM, y}$
Unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor for Southern regional grid
Source of data	Central Electricity Authority, Ministry of Power
Value(s) applied	0.9514
Choice of data or measurement methods and procedures	The data has been sourced from the Central Electricity Authority"s (CEA) Carbon Dioxide baseline database (Version 7.0) and is fixed ex-ante. The link to the database is provided below: http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Purpose of data/parameter	Computing Baseline emissions
Additional comments	The Operating Margin Emission Factor has been fixed for the duration of the entire crediting period.

Data/Parameter	$EF_{grid, BM, y}$
Unit	tCO_2/MWh
Description	Build margin CO_2 emission factor for Southern regional grid
Source of data	Central Electricity Authority, Ministry of Power
Value(s) applied	0.7338
Choice of data or measurement methods and procedures	The data has been sourced from the Central Electricity Authority"s (CEA) Carbon Dioxide baseline database (Version 7.0) and is fixed ex-ante. The link to the database is provided below: http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Purpose of data/parameter	Computing Baseline emissions
Additional comments	The Build Margin Emission Factor has been fixed for the duration of the entire crediting period.

Data/Parameter	$EF_{grid, CM, y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for Southern regional grid
Source of data	Central Electricity Authority, Ministry of Power
Value(s) applied	0.8426
Choice of data or measurement methods and procedures	The data has been sourced from the Central Electricity Authority"s (CEA) Carbon Dioxide baseline database (Version 7.0) and is fixed ex-ante. The link to the database is provided below: http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Purpose of data/parameter	Computing Baseline emissions
Additional comments	The Build Margin Emission Factor has been fixed for the duration of the entire crediting period.

Data/Parameter	$EF_{CO2, Diesel, y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of Diesel used in year y (tCO_2/GJ)
Source of data	As per the latest version 02 of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", options a, b & c are not available to the PP. Thus 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 has been chosen and is fixed Ex-ante.
Value(s) applied	74.1

Choice of data or measurement methods and procedures	IPCC default values
Purpose of data/parameter	Computing project emissions
Additional comments	The emission factor for diesel has been fixed for the duration of the entire crediting period.

Data/Parameter	$NCV_{Diesel, y}$
Unit	GJ/tonne
Description	Net calorific value of the Diesel in year y
Source of data	As per the latest version 02 of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", options a,b& c are not available to the PP. Thus, 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.
Value(s) applied	43.0
Choice of data or measurement methods and procedures	IPCC default values
Purpose of data/parameter	Computing project emissions
Additional comments	The net calorific value for diesel has been fixed for the duration of the entire crediting period.

D.2. Data and parameters monitored

Data/Parameter	$EG_{pj,y}$
Unit	MWh
Description	Net Electricity exported by project activity to the southern grid
Measured/calculated/ default	Calculated
Source of data	Form B (KPTCL)
Value(s) of monitored parameter	69,069.99
Monitoring equipment	NA
Measuring/reading/recording frequency	Monthly
Calculation method (if applicable)	Calculated as the difference between export and import $EG_{pj,y} = EG_{export} - EG_{import}$
QA/QC procedures	Since this is a calculated value the QA/QC procedures would be applicable to export and import data
Purpose of data/parameter	Computation of baseline emissions
Additional comments	The data would be archived for the crediting period plus two years.

Data/Parameter	EG_{export}
Unit	MWh
Description	Electricity exported by project activity to the southern grid
Measured/calculated/ default	Measured
Source of data	Form B (KPTCL)
Value(s) of monitored parameter	69,758.36 MWh (with application of error factor due to delay in calibration)

Monitoring equipment	NA
Measuring/reading/recording frequency	Monitoring frequency: Continuous Monitoring recording: Monthly
Calculation method (if applicable)	NA
QA/QC procedures	The energy meter would be calibrated annually. The accuracy of the meter would be 0.2s. The data would be cross-checked with the tariff invoices submitted to Karnataka Power Transmission Corporation Limited for the electricity supplied to the grid. The primary monitoring is done through a main meter and check meter which is located at the KPTCL Substation. Only in case of the main meter not being functional, the secondary monitoring would provide a backup (fail-safe measure) which is done through Check meters.
Purpose of data/parameter	Computation of baseline emissions
Additional comments	The data would be archived for the crediting period plus two years.

Data/Parameter	EG_{import}
Unit	MWh
Description	Electricity imported by project activity from the southern grid
Measured/calculated/ default	Measured
Source of data	Form B (KPTCL)
Value(s) of monitored parameter	598.58 MWh (with application of error factor due to delay in calibration)
Monitoring equipment	Energy meter (main meter and check meter)
Measuring/reading/recording frequency	Frequency of recording: Monthly
Calculation method (if applicable)	NA
QA/QC procedures	The energy meter would be calibrated annually. The accuracy of the meter would be 0.2s. The data would be cross-checked with the tariff invoices submitted to Karnataka Power Transmission Corporation Limited for the electricity supplied to the grid. Only in case of the main meter not being functional, the secondary monitoring would provide a backup (fail-safe measure) which is done through Check meters.
Purpose of data/parameter	Computation of baseline emissions
Additional comments	The data would be archived for the crediting period plus two years.

Data/Parameter	$FC_{Diesel,j,y}$
Unit	Litres or m^3 /year
Description	Quantity of Diesel combusted in process j during the year y
Measured/calculated/ default	Measured
Source of data	KPRPL records
Value(s) of monitored parameter	1,070.04
Monitoring equipment	Measurement: Ruler gauge of accuracy class of 1%
Measuring/reading/recording frequency	Monitoring frequency: As and when diesel is consumed at the site
Calculation method (if applicable)	NA
QA/QC procedures	The opening and closing stocks of diesel at the plant would be cross-verified with the diesel purchase receipts provided by the supplier.
Purpose of data/parameter	Computation of project emissions

Additional comments	The DG set would be used if KPRPL is not able to import electricity from the grid. As the expected use of diesel is very low, for ex ante calculations, diesel consumption has been assumed to be zero.

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 emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y) and project emissions (PE_y) as per the consolidated methodology ACM0002 version 13 as follows:

$ER_y = BE_y - PE_y$

Where :

ER_y : Emission Reductions in year y (tCO_2e/ yr)
BE_y : Baseline Emissions in year y (tCO_2e/ yr)
PE_y : Project Emissions in year y (tCO_2e/ yr)

As per ACM0002 version 13.0.0, baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO_2e/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

For the current monitoring period, the baseline emissions would

BE_y = 69,069.99 x 0.8426 (tCO_2e/MWh)
= 58,191 tCO_2e (Rounddown Values)

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

Since the project activity is a run of river hydro power plant and doesn't result in new reservoirs or increase of existing reservoirs.

Project activity emissions:
According to the chosen baseline methodology ACM0002 Version 13.0.0, the project emissions are calculated as follows:

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$

Where :

PE_y = Project emissions in year y (tCO_2e/yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2e/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

The emissions due to combustion of fossil fuels are calculated as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, Version 02 EB41[8].

The formula to use in case of fossil fuel (diesel) usage at the plant site is provided below:

$$PE_{Diesel,j,y} = \sum_{i}^{n} FC_{Diesel,j,y} * COEF_{Diesel,y}$$

Where:

$PE_{Diesel,j,y}$ = CO_2 emissions from Diesel combustion in process j during the year y (tCO_2e/yr);

$FC_{Diesel,j,y}$ = quantity of Diesel combusted in process j during the year y (mass or volume unit/yr)

$COEF_{Diesel,y}$ = CO_2 emission coefficient of Diesel in year y (tCO_2e/mass or volume unit)

The CO_2 emission coefficient $COEF_{Diesel,y}$ would be calculated based on net calorific value and CO_2 emission factor of Diesel, as mentioned in option B of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", (version 02). The formula hence used is:

$COEF_{i,y}$ = $NCV_{i.y}$ x $EFCO_{2,i,y}$

Where :

$COEF_{Diesel,y}$ = CO_2 emission coefficient of Diesel in year y (tCO_2/mass or volume unit)

$NCV_{Diesel.y}$ = weighted average net calorific value of the Diesel in year y (GJ/mass or volume unit)

$EF_{CO2,Diesel,y}$ = weighted average CO_2 emission factor of Diesel in year y (tCO_2/GJ)

Therefore for the current monitoring period,

Year	Quantity of Diesel consumed by the standby DG set in year y ($FC_{diesel, y}$) (Litre)	Weighted Average net Calorific Value of Diesel combusted in the project activity during the year, y ($NCV_{Diesel,y}$) (GJ/Tonnes)	Weighted average CO_2 emission factor of the diesel consumed in the project activity in year y ($EF_{Co2, diesel, y}$) (tCO_2/TJ)	Project Emission (after rounding up) (tCO_2e)
2015	7.23	43.0	74.1	1
2016	547.07	43.0	74.1	2
2017	515.74	43.0	74.1	2
Total	**1,070.04**			**5**

The project emission is PE_y = 5 tCO_2e

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

As the project activity is a run-off river hydro power plant, emissions of non-condensable gases from the operation of geothermal power plants is not applicable.

Hence $PE_{GP,y}$ = 0

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

As per the applied methodology, for hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for project emissions, estimated as follows:

If the power density (PD) of power plant is greater than 10 W/m^2 :

$$PE_{HP,Y} = \frac{EF_{Res} * TEG_y}{1000}$$

Where:

$PE_{HP,y}$ = Project emissions from water reservoirs (tCO_2e/yr)

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

EF_{Res} = Default emission factor for emissions from reservoirs of hydro power plants in year y ($kgCO_2e/MWh$)

TEG_y = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

$PE_{HP,y}$ = 0

The power density of the project activity was computed as follows –

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (W/m^2)

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

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)

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

	Value	**Unit**
Cap_{PJ}	24750000	W
Cap_{BL}	0	W
A_{PJ}	940000	m^2
A_{BL}	0	m^2
PD	**26.33**	W/m^2

Hence $PE_{HP,y}$ = 0

E.3. Calculation of leakage emissions

As per the consolidated methodology ACM0002, version 13.0.0, No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected.

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**	**Total amount**
Total	58,191	5	0	0	58,186	58,186

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)
58,186	148,638

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

Considering the annual average emission reductions as per the registered PDD which is 53,983 tCO_2e per year, the number of days covered during the current monitoring period comes out to be 1,006 days, based upon which the estimated emission reductions attributed to this monitoring period comes out to be 148,786 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 148,786 tCO_2e, whereas actual emission reductions achieved is 58,186 tCO_2e, which is approximately 60.9 % lower than the estimated emission reductions.

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

Not Applicable as the project activity is not a large scale project activity.

Document information

Version	*Date*	*Description*
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.
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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