Monitoring report form for CDM project activity
(Version 06.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT		
Title of the project activity	Cucuana Hydroelectric Power Plant	
UNFCCC reference number of the project activity	9830	
Version number of the PDD applicable to this monitoring report	04	
Version number of this monitoring report	01	
Completion date of this monitoring report	31/10/2018	
Monitoring period number	1st	
Duration of this monitoring period	01/11/2014 – 31/12/2017 (firs and last days included)	
Monitoring report number for this monitoring report	01	
Project participants	Empresa de Energía del Pacífico S.A. E.S.P.	
Host Party	Colombia	
Sectoral scopes	1: Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	ACM0002 ver.13 - Consolidated baseline methodology for grid-connected electricity generation from 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 t CO_2e	201,423 t CO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	227,978 t CO_2e	

SECTION A. Description of project activity

A.1. General description of project activity

The project consists of a hydroelectric power plant, with a nominal water capacity of 55 MW (total installed capacity of 58.16 MW[1]), with the aim of making use of the capacity of the Cucuana and San Marcos rivers (San Marcos is a tributary of the Cucuana River). The project contributes to the improvement in the efficiency of the electricity system in general; increasing the electricity service in the department of Tolima, while contributing to the sustainable development of the region with the reduction of CO_2 emissions.

The Cucuana Hydroelectric Power Plant (hereafter, the project activity or project) is owned and operated by Empresa de Energía del Pacífico S.A. E.S.P. (hereafter, the project proponent). The project activity is a hydroelectric power plant that utilizes water from the Cucuana river and San Marcos river, located in the department of the Tolima, Colombia (hereafter, the Host Country).

The energy that is generated by the project is dispatched to the National Interconnected System (SIN[2]). Thus, it contributes to sustainable development by increasing the share of renewable energy and reducing GHG emissions.

During the current reporting period from 01/11/2014 to 31/12/2017, the project has generated 505,140 MWh and reduced 201,423 tons of CO_2e.

A.2. Location of project activity

The project of the Hydroelectric Power Plant of Cucuana is an exploitation of the capacity of the Cucuana and San Marcos Rivers (San Marcos is a tributary of the Cucuana River) and is located on the middle section of the basin of the Cucuana River, which include the sub-basin of the San Marcos River. The water flows through the river points 2,200 and 1,500 metres above sea level, in the department of Tolima, municipality of Roncesvalles. The municipality's head is located in the southwest of Ibagué, department's capital, and the access is possible through Ibagué-Rovira-Roncesvalles path within a length of 110 km. A different and longer access is through Espinal-Guamol-Ortega-Chaparral-San Antonio-Roncesvalles path. The engine house is located in the elevation 1,500, before the mouth of the San Marcos tributary into the Cucuana River, in the municipality of Roncesvalles.

In particular, the water intake point is located on the following coordinates in decimal format.

ENGINE HOUSE	4.016247º	-75.526683º

[1] Given by the nameplate of the turbine

[2] In Spanish: *Sistema Interconectado Nacional*

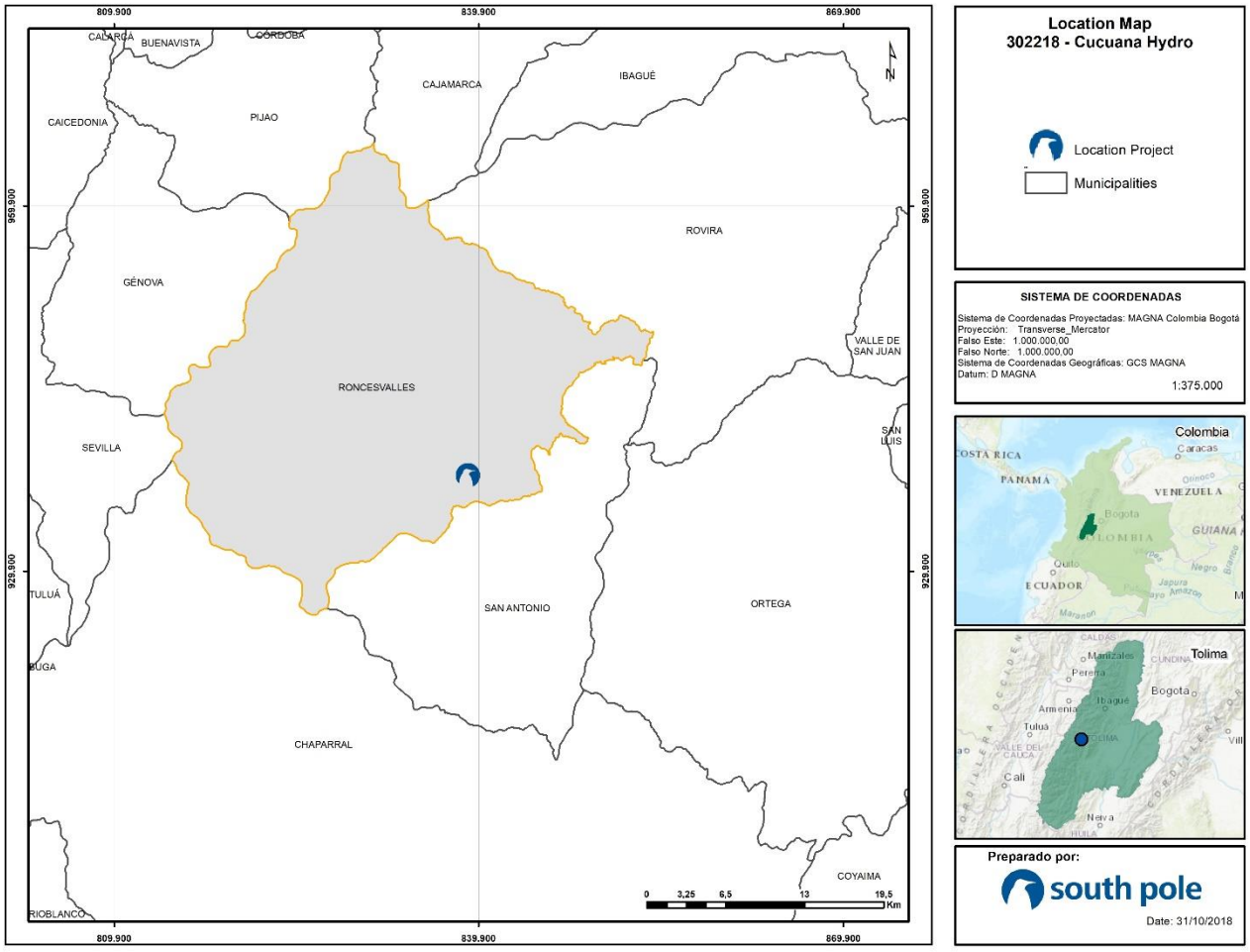

Figure 1: Location of the Cucuana hydroelectric power plant

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Colombia (Host)	Empresa de Energía del Pacífico S.A. E.S.P.	NO

A.4. Reference to applied methodologies and standardized baselines

The methodology applied to the registered CDM project activity is ACM0002 Version 13.0.0 *"Consolidated baseline methodology for grid-connected electricity generation from renewable sources".* This methodology draws upon the following tools:

- *Tool for the demonstration and assessment of additionality* (version 0.7.0.0)
- *Tool to calculate the emission factor for an electricity system* (version 03.0.0)

A.5. Crediting period type and duration

01 Nov 14 - 31 Oct 2021 (Renewable)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

This project has two water catchments, one in the Cucuana River and one in San Marcos River. In the Cucuana River, water is collected in the point 2,170 metres above sea level and is driven to an intake chamber, a gravel removal system and from here it is driven through an adduction channel until a calming chamber which also collects the water collected in the San Marcos River at the elevation 2,179.5 metres above sea level and which after passing through a gravel removal system is driven until the calming chamber through the San Marcos tunnel. From this calming chamber, both water flows pass through a sedimentation basin and afterwards are driven through a pressure tunnel (Cucuana tunnel), a pressure pipe (La Ensillada siphon) and a conduction tunnel (La Ensillada tunnel) to finally arrive to the load pipe which split into two flows to distribute to four Pelton turbines in tandem configuration. The turbines are hosted in a surface machine house with their respective generators, valves and control panels. The engine house also hosts the connections yard.

The electrical energy distribution line is rated at 115 KV using a simple circuit with metallic small towers, and it is connected to the sub-station of Mirolindo, located in Ibagué, capital of the department of Tolima. The distribution line is 64.3 km in length, starts in the engine house and pass through rural areas in the municipalities of Roncesvalles, San Antonio, Rovira and Ibagué.

A small explanation of each stage and unit mentioned in the previous paragraph is included below:

- **Collection in Cucuana River**:

  - **Dam**: it is located in the point 2,172 metres above sea level and its function is to generate a small damming that allow the water collection from the river above (its function is not to store water but to make easier the collection of water). It is designed to evacuate a maximum rising tide of the last 1,000 years by the Cucuana River.
  - **Desilting canal**: it is located in the left margin of the Cucuana River and allows the handling of the river during the construction of the dam as well as to establish a fast flow in front of the lateral collection point that allow sweeping all the sediments aggraded in front of it.
  - **Water collection**: the water intake point or bypass point is a lateral collection point at 2,170 metres above sea level and is formed by two units with gratings leaning 15 º with respect the vertical line.
  - **Intake chamber and Gravel removal system**: they act as transition between both the water intake point and the adduction channel and the sedimentation basin. The last one has a structure that allows to discharge the required ecological flow downstream the water collection, especially in the low-water season due to in the high-water season water run over the dam. The discharge of the ecologic flow happen downstream the dam in the Cucuana River through the desilting canal.
  - **Adduction channel**: it has a slope of 0.11% and drives water collected in the Cucuana River until the sedimentation basin.
  - **Calming tank**: it also receives the water collected in the San Marcos River. From this point both water flows from the Cucuana and San Marcos rivers are delivered into the sedimentation basin.

- **Collection in San Marcos River**:

  - **Dam**: it is located in the point 2,181.5 metres above sea level and its function is to generate a small damming that allow the water collection from the river above (its function is not to store water but to make easier the collection of water).It is designed to evacuate a maximum rising tide of the last 1,000 years.
  - **Desilting canal**: it is located in the right margin of the San Marcos River and allows the handling of the river during the construction of the dam as well as to

establish a fast flow in front of the lateral collection point that allow sweeping all the sediments aggraded in front of it.

- **Water collection**: the water intake point or bypass point is a lateral collection point at 2,179.5 metres above sea level and is formed by one unit with gratings leaning 15 º with respect the vertical line.
- **Gravel removal system**: it acts as transition between both the water intake point and the adduction channel to the San Marcos tunnel. The last one has a structure that allows to discharge the required ecological flow downstream the dam through the desilting canal.
- **Connexion channel**: it links the gravel removal system with the San Marcos tunnel and has a slope of 0.64% and 14.1 metres in length.

- **San Marcos tunnel**: it is a free-flow diversion tunnel with 1,076 metres in length, a slope of 0.67% and a horseshoe section. This tunnel delivers the water collected in the San Marcos river into the calming chamber located upstream of the sedimentation basin.
- **Sedimentation basin**: it is a double sand trap that eliminates thin sediments collected in the Cucuana River and the ones diverted from San Marcos River.
- **Cucuana tunnel**: horseshoe section and partially lined tunnel with 1,698 metres in length and a diameter of 3 metres. Its slope is 2% and it delivers to La Ensillada siphon at the point 2,130.43 metres above sea level.
- **La Ensillada pipe**: it is a metallic pressure pipe with 137.7 metres in length and a diameter of 1.75 metres. Its function is to overcome the small plateau that is in the alignment of the conduction tunnel that links the Cucuana River with the load pipe in the engine house. The pipe is superficial and it delivers to La Ensillada tunnel.
- **La Ensillada tunnel**: horseshoe section and partially lined tunnel with 1,700.9 metres in length, a diameter of 3 metres and a slope of 0.4%. At the end of the tunnel there is a holder with a vertical well.
- **Load pipe**: it is 1,596 metres long and is divided in four parts with different diameter. This pipe splits into two flows to distribute to two generation units at the point 1,453 metres above sea level.
- **Engine house**: house of the superficial type that integrates the spaces required to host the two sets of generators with four Pelton turbines of 58.14 MW of installed capacity in tandem configuration and the connection's yard. The installed capacity of each generator is the same, and is thus equivalent to 50% of the total capacity of 58.16 MW with a water capacity of 55 MW.
- **Discharge structure**: it allows to return the water flow diverted upstream to the Cucuana River. It is formed by a box-culvert, a dissipation chamber and a delivery trapezoidal channel. The discharge takes place at the point 1,443.00 metres above sea level.
- **Electrical distribution line**: line that enables the connection of the energy generated between the engine house and the sub-station of Mirolindo. The distribution line pass through rural areas in the municipalities of Roncesvalles, San Antonio, Rovira and Ibagué
- **Complementary civil works**: access path to the collection, holder, engine house, adaptation of landfills, rehabilitation of current routes, expansion of energy networks for the construction, workshops, offices, concrete and crusher plant and personnel facilities for workers.

B.2. Post-registration changes

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

There have not been any temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines during this monitoring period.

B.2.2. Corrections

There have not been any corrections to project information or parameters fixed at the registration or renewal of crediting period of the project activity.

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

There have not been any changes to the start date of the crediting period fixed at the registration of the project activity.

B.2.4. Inclusion of monitoring plan

There has not been any 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 applied standards or tools

There have not been any permanent changes to the registered monitoring plan, or permanent deviation of monitoring from applied methodologies, applied standardized baseline, or other applied standards or tools.

B.2.6. Changes to project design

There have not been any changes to the project design of the project activity.

SECTION C. Description of monitoring system

The project uses the approved ACM0002 monitoring methodology "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", version ACM0002, Version 13.0.0. In the case of the Power Plant of Cucuana[3], this document establishes that the following data must be monitored:

1. Electricity generated by the project's activity

2. Data required to recalculate the operating margin emission factor

All data required for the verification and issue of CERs was stored in electronic format during at least two years after the end of the crediting period or the last issue of CERs for the project.

EPSA has a Quality Improvement System that has been certified by the ISO 9001 standard and is applied to the Energy Generation, Transmission, Distribution and Retail Marketing processes, as well as Diverting Processes and Support Processes that could have an impact on the quality of the products or services supplied by EPSA. To ensure employee training the procedure PR.GRH.07.002, "Procedure for the Develop of Competencies" is available.

[3] This plant does not have a reservoir or water reserve to opérate during at least 10 days.

The general operation of the plant of Cucuana and the Monitoring Plan for the reduction of GHG emissions was integrated within the System, being subject to an audit by a third part that guarantee its correct implementation.

The monitoring plan was designed with the purpose of guaranteeing that the project activity is correctly organised from the start, in terms of data gathering and maintenance, as required to obtain realistic GHG emission data.

Therefore, the Supervisor of the project activity maintenance tasks was defined prior to the start of the crediting period, who shall assume the development and execution of the monitoring plan.

The project activity was supervised throughout the crediting period with the measurement systems that provided the official flow, energy and power measures.

The Hydroelectric Power Plant of Cucuana delivered its energy to the interconnected system in the sub-station of Mirolindo, which is where the commercial frontier registered with the Administrator of the electrical interconnected system - XM- established. The information was recorded each day by two measurement units with a precision of 0.2 and the active energy dispatched the previous day must be reported at 8:00 in the morning.

The energy control department is responsible for the maintenance and supervision of the measurement equipment, which monitored the deviations presented with its verification and energy balancing systems.

The complete revision of the measurement equipment is carried out every two years and the industrial measurement area is in charge of coordinating these processes with the production management area.

To guarantee the ecologic flow in the section of the Cucuana and San Marcos rivers, two measurements are taken respectively: one measures the total flow before its collection and the other one is taken in the bypass channel. The difference between these values gives the natural river flow volume. To guarantee that the ecologic flow is 22% of the total before its collection, the measurements taken on these two points are recorded on a system that is in charge of processing the information and adjusting the gate automatically to guarantee the flows required.

The plant has all equipment required for the instantaneous measurement of the active and apparent power, power levels, current per phase, power factor and energy delivered per turbine generator group. These measurements are local and remote from the EPSA control centre.

The following sheme shows the power plant, the substation and the metering points:

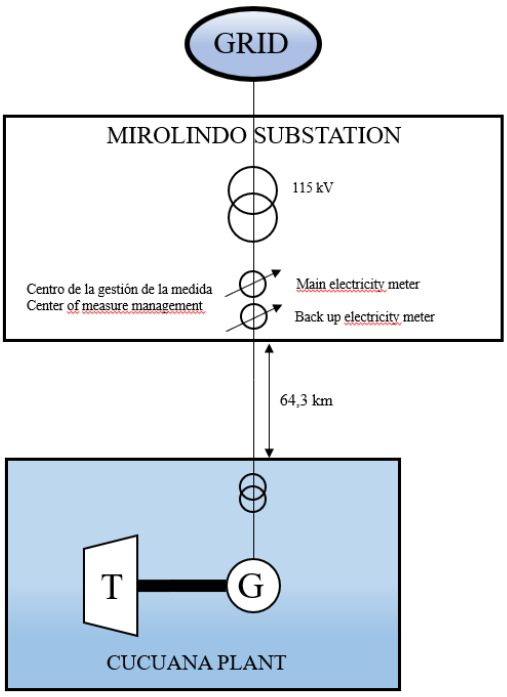

Figure 2: : Metering scheme of the Cucuana hydroelectric power plant

Likewise, the Plant's Operation Reports are used as a reference and are available for any inspections carried out during the crediting period, including the following aspects:

- Annual electricity production, broken down by month, is part of the Plant Operation Log, with all real and reactive power production data.
- Annual and monthly plant factor.
- Maximum annual and monthly demand.
- Annual and monthly load factor.
- Annual and monthly consumption of turbines.
- Relevant events during the year.

The Project Manager is responsible for the implementation and update of all data and parameters monitored, included in the previous section, ensuring that the emission reduction calculations obtained are realistic and based on evidence. Likewise, said Supervisor is in periodical contact with the person responsible for the execution of the Environmental Handling Plant of the Hydroelectric Power Plant of Cucuana, with the purpose of guaranteeing the execution of the project and that it contributes to the social and environmental development of the Cauca Valley.

In addition, the following data which are necessary to calculate the baseline was downloaded annually from the NEON system:

- Quantity of electricity generated by the Minor Hydroelectric Power Plant of Cucuana each hour. The measurement data registered by the personnel of EPSA was compared with the data provided by the NEON system to detect possible error.
- Annual electricity generated by each plant of the National Interconnected System of Colombia.
- Electricity generated by the National Interconnected System of Colombian hourly.
- New plants built and those commissioned in the National Interconnected System of Colombia, in order to update the list of the plants that can be included in the calculation of the build margin emission factor. This data was downloaded from the NEON system if the Electricity Market Regulator does not provide such information.

Annually, it was also updated the calculation of:

- Annual electricity generated by low-cost/must-run power plants and the rest of the power plants.
- Fuel consumption of each power unit.
- Emission factor of each plant.
- Operating margin emission factor.
- Build margin emission factor.
- Baseline emission factor.

All data and parameters were recorded in accordance with the quality systems of the companies participating in the project, with their corresponding quality control and assurance procedures, Likewise, there is a record of the Power Plant Operation reports, in accordance with these procedures.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,BM,y}$
Unit	t CO_2/MWh
Description	Building margin CO2 emission factor of the grid in year y using the "Tool to calculate the emission factor for an electricity system"
Source of data	As per the "Tool to calculate de emission factor for an electricity system"
Value(s) applied	0.2345
Choice of data or measurement methods and procedures	As per the "Tool to calculate de emission factor for an electricity system"
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	EF_{Res}
Unit	Kg CO_2e/MWh
Description	Default emission factor for the emissions of reservoirs of hydro power plants
Source of data	Decision by EB23
Value(s) applied	90 Kg CO_2e/MWh.
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of project emissions
Additional comments	This value will be revised when a new value is determined and indicated.

Data/Parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	Determine the installed capacity based on recognized standards

Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/Parameter	A_{BL}
Unit	m^2
Description	Area of the single reservoir measured in the surface of the water, before the implementation of the project, when the reservoir is full. For new reservoirs, this value is zero
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

D.2. Data and parameters monitored

Data/Parameter	$EG_{facility, y}$
Unit	kWh/yr
Description	Quantity of net electricity generation supplied by the project plant to the grid in the year y.
Measured/calculated/ default	-
Source of data	Project activity site. It was measured by EPSA,
Value(s) of monitored parameter	114,400,000 kWh/ year.
Monitoring equipment	Meters
Measuring/reading/recording frequency	The quantity of energy generated was monitored by EPSA each hour. The data obtained was recorded once a month on a spreadsheet. In addition, the data was also be provided by the NEON system, which was downloaded annually and recorded on a different spreadsheet
Calculation method (if applicable)	-
QA/QC procedures	Cross check measurement results with records for sold electricity: the measurement units of the energy transferred from the plant to the network was calibrated periodically in accordance with the standards established by the national authorities or at least every 3 years. The measurement data registered by the personnel of EPSA was compared with the data provided by the NEON system to detect possible error. There is the procedure PR.PRO.03.0001, “Procedure for control of the production equipment”, to carry out the calibration and verification (internal and external) of measuring equipment.
Purpose of data/parameter	Project emission
Additional comments	-

Data/Parameter	$EG_{m, y}$, $EG_{k, y}$
Unit	kWh
Description	Net electricity generated and supplied to the National Interconnected System of Colombia by plant m or k during the year y.
Measured/calculated/ default	-

Source of data	NEON system
Value(s) of monitored parameter	See annex (xlsx)
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	The quantity of energy generated by the power plants during the year is registered in the NEON System as "Real Generation". This system was accessed once a year to download data, which was stored in an electronic spreadsheet. It should take into account each year adding new power plants and their typology.
QA/QC procedures	The hourly data of the total generation of the system and the hourly data corresponding to each plant was downloaded. The sum of all individual data was checked, in order to ensure that it is similar to the total system generation data. In case there are differences between the two types of data, the reasons and sources were analysed and errors was corrected
Purpose of data/parameter	Baseline
Additional comments	-

Data/Parameter	$EG_{grid, y}$
Unit	kWh
Description	Net electricity generated and supplied to the National Interconnected System of Colombia by all power sources. See annex (xlsx)
Measured/calculated/ default	-
Source of data	NEON system
Value(s) of monitored parameter	The data obtained from the NEON system and corresponding to each hour of the year 2012 to 2017 have been applied.
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	The quantity of energy generated by the System is registered in the NEON System as "Real Generation". This system was accessed once a year to download data, which was stored in an electronic spreadsheet
QA/QC procedures	-
Purpose of data/parameter	-
Additional comments	-

D.3. Implementation of sampling plan

N/A

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

The baseline scenario represents the electricity delivery to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. So, the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel power plants that are displaced due to the project activity. The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$ **[Equation 1]**

Where:

- BE_y= Baseline emissions in year y (tCO_2)
- $EG_{PJ,y}$= Quantity of net electricity generation that is produced and fed into the grid as result of the implementation of the CDM project activity in year y (MWh)
- $EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y (tCO_2/MWh)

The method selected to calculate the operating margin (OM) emission factor is the Simple Adjusted Method, i.e., "option b", for the calculation of the emission factor of the operating margin of the "Tool to calculate the emission factor for an electricity system".

The operating margin emission factor can be calculated:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required
- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

In this case, the calculation ex-post has been selected for calculating the operation margin emission factor, so it is recalculated annually. And it is calculated as follows:

$$EF_{grid,OM-adj,y} = (1 - \lambda_y) \times \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \times \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$ **[Equation 2]**

Where:

- $EF_{grid,OM-adj,y}$ = Simple adjusted operating margin CO_2 emission factor in year y (tCO_2/MWh).
- λ_y = Factor expressing the percentage of time when low-cost/must-run power units are on the margin in the year y
- $EG_{m,y}$ =Net quantity of electricity generated and delivered to the grid by plant min year (MWh)
- $EG_{k,y}$ =Net quantity of electricity generated and delivered to the grid by plant kin year (MWh)
- $EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (t CO_2/MWh)
- $EF_{EL,k,y}$ = CO_2 emission factor of power unit k in year y (t CO_2/MWh)
- *m* = All grid power units serving the grid in year y except low-cost/must-run power units
- *k* = All low-cost/must-run grid power units serving the grid in year y

The option selected for the calculation of the emission factor for each plant is based on the fuel consumption (option A1) of the different plants of the National Electrical System. According to this option, for a power unit m only data on electricity generation and the fuel types used is available:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,y,i}}{EG_{m,y}}$$ **[Equation 3]**

Where:

- $EF_{EL,m,y}$ is the emission factor of plant m in year y in tCO_2/MWh.
- $FC_{i,m,y}$ is the Amount of fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
- $NVC_{i,y}$ is the Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
- $EF_{CO2,i,y}$ is the CO_2 emission factor of fuel type *i* in year y ($t\ CO_2/GJ$)
- $EG_{m,y}$ is the Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
- *m* = All power units serving the grid in year y except low-cost/must-run power units
- *i* = All fuel types combusted in power unit *m* in year *y*
- *y* = The relevant year as per the data vintage chosen

The parameter λ_y is defined as follows:

$$\lambda_y(\%) = \frac{\text{Nº hours low} - \text{cost/must} - \text{run sources are on the margin during the year y}}{8760\ hours..per..year} \quad \textbf{[Equation 4]}$$

- Step i: The total hourly generation data of the year are presented, from high to low, in comparison to the total 8,760 hours of the year.
- Step ii: Calculate the total annual generation of low-cost/must-run plants ($\sum_k EG_{k,y}$).
- Step iii: Draw a horizontal line that crosses the line represented, so that the area under the curve represents the total generation of low-cost/must-run plants ($\sum_k EG_{k,y}$).
- Step iv: Determine value λ_y, taking into account that λ_y is calculated as X/8,760, where X represents the hours on the right of the point of intersection.

Build margin (BM) emission factor:

Option 1 of the "Tool to calculate the emission factor for an electricity system", Version 03.0.0, has been selected for the calculation of the build margin emission factor, which states that, for the first crediting period, the build margin emission factor is calculated (ex-ante) based on the most recent information available on units already built at eh time of CDM-PDD submission to the DOE for validation. So, this option does not require monitoring emission factor during the crediting period.

The baseline emission factor (EF_y) is obtained with the Weighted average CM method through operating and build margin emission factors:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad \textbf{[Equation 5]}$$

Where:

- $EF_{grid,CM,y}$= Combined margin emission factor during year y (tCO_2/MWh). –
- w_{OM}= Weighting of the operating margin emission factor (%).
- $EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh).
- w_{BM} = Weighting of the build margin emission factor (%).
- $EF_{grid,BM,y}$ =Build margin CO_2 emission factor in year y (tCO_2/MWh).

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

There are no forecasted project emissions related to the generation of energy based on renewable sources (PE=0)

E.3. Calculation of leakage emissions

According to the methodology ACM0002 v.13.0.0 no leakage emissions are considered

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	201,423	0	0	0	201,423	201,423

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 ($t CO_2e$)
201,423	227,978

E.6. Remarks on increase in achieved emission reductions

There is no increase in emissions achieved.

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Document information

Version	*Date*	*Description*
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.

Version	*Date*	*Description*
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.

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