CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small-scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

"Mini-Hydropower Generation Programme Utilizing Irrigation Canal in XXXX, Philippines"
Version 1
30th January 2009

A.2. Description of the small-scale CPA:

Description of the CPA:
This CPA is implemented under the Programmatic of Activity (PoA), "Mini-Hydropower Generation Programme Utilizing Irrigation Canal in the Philippines." The coordinating/managing entity of this PoA is the National Electrification Administration (NEA), which is a government-owned entity promoting electrification throughout the Philippines.

The goals of the PoA are to reduce the dependence on fossil fuels as an energy source and to generate sustainable income for the National Irrigation Administration (NIA) to enable and enhance the management and maintenance of their irrigation systems. By promoting the implementation of environmentally friendly mini-hydropower generation projects that utilize unused heads of irrigation canals, greenhouse gas emissions will be avoided by replacing electricity generated from fossil fuel combustion with renewable energy for power supply to the grid. Furthermore, the project activity will create a sustainable source of income for the NIA. By collecting fees from leasing the irrigation system to the hydro electricity developers, the NIA can allocate resources to manage and maintain the irrigation system.

This CPA aims to generate renewable energy utilizing a mini-hydropower generation facility installed at an irrigation canal in XXXX, XXXX Province. The generated hydropower will replace the existing electricity supply to the grid, which includes electricity from power plants that use fossil fuels for power generation. Therefore the implementation of the CPA will reduce the overall greenhouse gas emissions. Estimated annual power generation is XXXX GWh (XXXX kW rating). Annual emissions reduction from the CPA is expected to be XXXX t CO_2 equivalent (a total of XXXX t CO_2 equivalent within the first crediting period).

The implementer of the CPA is the Regional Electric Cooperatives (REC) of XXXX, which is responsible for the collection and monitoring of data as well as the operation and management of the mini-hydropower generating facility.

In this CPA, electricity is generated at a canal drop with a XXm-fall height (minimum fall is XXm). Maximum water plant discharge is set at XXm^3/s, which is the most economically efficient flow rate estimated from the measured data. **XXXX** Submergible Turbine Generator is installed.

Insert the picture of the site

Figure1. Project site of the CPA

Purpose of the CPA:

The purpose of the CPA is to "co-benefit" both the global environmental aim to reduce greenhouse gas emissions, as well as the local socio-economic needs. Promoting the implementation of mini-hydropower generation through this CPA contributes to the sustainable development of XXXX area in XXXX Province by bringing about the following economic, social and environmental benefits:

Economic/Social Benefits

- Sustainable hydropower development: Because the hydropower system is small-scale and simple, the investment cost for CPA implementation is low. The revenue gained through electricity generation and Certified Emission Reductions (CER) sales can be utilized to further develop hydro energy that meets the financial and social needs of local communities. This will lead to the socioeconomic development of agricultural communities throughout the Philippines.
- Investments from Japan to the local economy

Environmental Benefits

- Reduction of greenhouse gas emissions
- Generation of renewable energy without new development on natural landscapes: No new natural land needs to be developed because the mini-hydropower system will utilize agricultural dams and irrigation canals that are already in place.
- Emission reductions of air pollutants (SOx, Nox): SOx, NOx emission will be reduced through replacing conventional grid, most of which are generated through burning of fossil fuel, with hydro electricity.
- Reduction of improper organic waste accumulation in irrigation canals: Hydropower system will require periodic removal of organic waste to avoid waste materials from disrupting the turbine.

A.3. Entity/individual responsible for the small-scale CPA:

The implementer of the CPA is Regional Electric Cooperatives (REC) of XXXX.

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

Republic of the Philippines

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The project site (location of the mini-hydropower generating facility) in XXXX is located at an existing irrigation canal. Latitude of the project site is N XX ° XX ′ XX ″, and longitude is E XX ° XX ′ XX ″.

Figure2. Location of the Project Site

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

This starting date of this CPA is 1st of XXXX, which is the same date as the proposed PoA.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

21years

A.4.3. Choice of the crediting period and related information:

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

>>
The starting date of the crediting period is the registration date.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Table 1. Estimated amount of emission reductions

Years	**Estimation of annual emission reductions (tCO_2e)**
2009	XXXX
2010	XXXX
2011	XXXX
2012	XXXX
2013	XXXX
2014	XXXX
2015	XXXX
Total emission reductions (tCO_2e)	XXXX
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tCO_2e)	XXXX

A.4.5. Public funding of the CPA:

Public funding from each related municipality is involved in this CPA. However, this CPA does not include any diversion of ODA funds.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM or an application to register another small-scale CDM with the following characteristics:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The project participant of the CPA is REC of XXXX. This CPA is the first and only CPA that REC of XXXX is part of. Therefore, it can be inferred that the CPA does not have the same project participants with any other CPAs (first criteria), thus verifying that the CPA is not a debundled component of another CPA.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

NEA, who is the managing entity of the PoA in which this CPA is under, will periodically obtain and update information regarding CDM project activities and PoAs related to hydropower generation. Prior to the implementation of the CPA, NEA will verify that the small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA by crosschecking the geographic location of the CPA with existing CDM project activities.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

"Mini-Hydropower Generation Programme Utilizing Irrigation Canal in the Philippines"
Version 1

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

This CPA is eligible to be included in the registered PoA since it satisfies the criteria defined in A.4.2.2. in CDM-SC-PoA-DD of the registered PoA as described below.

- A mini-hydropower generation project that newly installs a mini-hydropower generation facility installed in irrigation canals that are owned by the NEA
  →Applicable
  (The activity of this CPA is described in A.2 of CDM-SC-PoA-DD of the registered PoA)

- The technology to be applied must be the Submergible Turbine Generator
  → Applicable
  (The technology to be applied is the Submergible Turbine Generator)

- Located within the Republic of the Philippines
  → Applicable
  (The location of this CPA is described in A.4.1.2. of CDM-SC-PoA-DD of the registered PoA)

- Maximum electricity generation volume less than or equal to 15MW
  →Applicable
  (Maximum electricity generation capacity is XXXX kW as shown in A.2.)

- Instalment of a renewable energy facility that supplies electricity to and/or displace electricity from an electricity distribution system that is (or would have been) supplied by at least one fossil fuel fired generating unit.
  →Applicable
  (This CPA is a new facility that provides electricity to a power system that supplies its electricity from more than or equal to one fossil fuel electricity facility, as shown in A.2. of CDM-SC-PoA-DD of the registered PoA)

- Monitors and collects appropriate data on the parameters listed in A.4.4.2 of CDM-SC-PoA-DD of the registered PoA
  → Applicable.
  'Monitoring items in A.4.4.2. of CDM-SC-PoA-DD of the registered PoA will be applied)

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

In the absence of the CPA, XXXX's irrigation canal faces barriers in the following three areas: the technology barrier, barrier due to prevailing practice and access-to-finance barrier. These barriers have prevented the implementation of hydropower facilities in XXXX. Therefore, electricity remains to be supplied from the national grid system where much of the electricity is generated from burning fossil fuel, and greenhouse gases are emitted.

a) Technology barrier:
The Submergible Turbine Generator applied in this CPA is a unique technology developed in Japan, where the generator can be installed within existing irrigation system and canals. To this day, there is no known case of the instalment of this technology in the Philippines. Therefore, manufacturing and maintenance capacity of this particular technology is limited, thus causing a technology barrier to the implementation of the CPA.

b) Barrier due to prevailing practice
There are many existing hydropower plants in the Philippines. However, in terms of hydropower generation utilizing existing irrigation systems, actualization of projects have been very rare. In addition the technology to be applied to the CPA is the first of its kind technology in terms of hydropower generation facility to be installed within water at an irrigation canal. Therefore, there is a barrier due to prevailing practice.

c) Access-to-finance barrier:
Because the size of the hydropower generation system placed within the irrigation system of this CPA is very small, it is extremely difficult to procure funds from the financing banks unless the project is implemented as a CDM project. Implementing this project under the CDM scheme becomes a crucial component of the bank's investment criteria. Therefore, there is an access-to-finance barrier where access to capital will be limited in the absence of the CDM

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The project boundary for this CPA includes the physical and geographic location of each mini-hydropower generation facility. In the baseline scenario, greenhouse gases are emitted by power generation sources of the grid electricity. On the other hand, greenhouse gas will not be emitted within the project boundary and project scenario of this CPA because no fossil fuel is used for electricity generation or transportation.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

The detailed information on the data and parameters that does not require monitoring are described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in B.6.1.

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	[for the CPA which supplies electricity to the Luzon or the Luzon-Visayas grid] Net electricity generated and delivered to the XXXX grid by all power sources serving the system in year y not including low-cost / must-run power plants / units [for the CPA which supplies electricity to the Visayas or the Mindanao grid] Net electricity generated and delivered to the XXXX grid by all power sources serving the system in year y
Source of data used:	Department of Energy, the Philippines
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{i,y}$
Data unit:	MWh
Description:	The average power generation of the XXXX grid for the year y from fossil fuel type I
Source of data used:	Department of Energy, the Philippines
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{m,y}$
Data unit:	MWh
Description:	Net quantity of electricity generated and delivered to the XXXX grid by power unit m in year y
Source of data used:	Department of Energy, the Philippines
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	The statistics data provided by the Department of Energy
Any comment:	

Data / Parameter:	$Heat\ Rate_i$
Data unit:	BTU/kwh
Description:	Heat energy content of the fuel needed to produce one kilowatt hour (kWh) of electricity. It is a measure of a plant’s energy efficiency, expressed in British Thermal Units per kWh (BTU/kWh).
Source of data used:	Department of Energy, the Philippines
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$EF_{CO2,I}$
Data unit:	tCO2/TJ
Description:	The carbon emission factor of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$CC_{,I}$
Data unit:	tC/TJ
Description:	Carbon contents of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$OXID_{,I}$
Data unit:	%
Description:	Carbon oxidation factor of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	CF
Data unit:	TJ/BTU
Description:	Conversion factor from BTU into TJ
Source of data used:	-
Value applied:	1.055×10^{-9}
Justification of the choice of data or description of measurement methods and procedures actually applied:	Theoretical value
Any comment:	

Data / Parameter:	$Electricity_y$
Data unit:	MW
Description:	Power generation capacity of installed plant
Source of data used:	Specification of the facility provided by the maker
Value applied:	XXXX
Justification of the choice of data or description of measurement methods and procedures actually applied:	The specification of the facility is guaranteed by the maker
Any comment:	

Data / Parameter:	T_y
Data unit:	hours/year
Description:	Operation hours of installed plant
Source of data used:	the project plan based on the river flow study
Value applied:	XXXX
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

(i) Baseline Emissions

Based on SSC AMS-I.D., baseline emissions are obtained by the following steps:

Step 1. Emission Factor Calculation

Step 1-1. Select an Emission Factor Option

The baseline is the electricity generation (MWh) produced by the renewable generating unit multiplied by an emission factor (tCO2e/MWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

This CPA applied option (a) for calculation of the baseline emission factor.

Step 1-2. Determination of OM Emission Factor Calculation Method

The calculation of the operating margin emission factor (EF_{grid},OM,$_{y}$) is based on one of the following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

The annual load duration curve and grid system dispatch data is necessary for Method (b) and (c) respectively, however, these data are not open to public. Therefore, Methods (b) and (c) cannot be applied to this CPA.

Renewable energy (hydro, geothermal, wind, biomass, solar) and nuclear power are considered as sources of low-cost/must-run power generation. Therefore, Method (a) is obtained by the weighted average of the unit electricity generation volume of power plants excluding renewable energy and nuclear power plants. On the other hand, Method (d) is the average emission factor of all power plants connecting to the grid.

Method (a) can be used only if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Based on "Tool to calculate the emission factor for an electricity system", this CPA will utilize Method (a) if the 5-year generation-weighted average data indicates that the percentage of electricity generated from low-cost/must-run power plants are less than/equal to 50% of the total electricity generated within the grid. If this percentage is above 50%, Method (d) will be applied.

The grid system, which this CPA is to provide electricity, is the XXXX grid. The proportion of electricity supply by low-cost/must-run power plants on average of 2003-2007 is XXXX % which is lower than/exceeds 50%. Therefore, for this CPA, Simple OM/Average OM Method is applied to OM calculation of this CPA.

Table 2 OM Calculation Method to Be Applied to The Grid Systems in The Philippines

Grid	Proportion of Electricity Supply by Low-cost/Must-run Power Plants (2003-2007)	Option applied
Luzon	18.8% < 50%	Simple OM
Visayas	73.0% > 50%	Average OM
Luzon-Visayas	28.3% < 50%	Simple OM
Mindanao	66.7% > 50%	Average OM

Step 1-3. Calculate The OM Emission Factor According to The Selected Method.

Calculation of Simple OM [Method (a)]

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the XXXX grid, not including low-cost / must-run power plants / units.

$$EF_{grid,OMsimple,y} = \frac{\sum_i F_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{GEN_y}$$ ……Equation (1)

Where,

$EF_{grid,OMsimple,y}$: Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$: CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
GEN_y: Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i: All fossil fuel types combusted in power sources in the project electricity system in year y
y: Either the three most recent years for which data is available at the time of submission of the CDM-PDD to Designated Operational Entity for validation (ex ante option)

For calculation, if only electricity generation and the fuel types used is available, the emission factor should be determined based on the CO2 emission factor of the fuel type used and the efficiency of the power unit.
In the Philippines, data on the fossil fuel consumption for power generation is not publicly available, and therefore, for this CPA, the heat energy content (Heat Rate) as an indication of the efficiency of each fuel type is used for the calculation of "$F_{i,a,y}$ multiplied by $NCV_{i,y}$ " as shown in the Equation (2):

$$F_{i,y} \times NCV_{i,y} = GEN_{i,y} \times HeatRate_i \times CF \times 1000 \qquad \text{......Equation (2)}$$

Where,

$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$GEN_{i,\,y}$: The average power generation for the year y from fossil fuel type i (MWh).

Heat $Rate_i$: The heat energy content of the fuel needed to produce one kilowatt hour of electricity (BTU/kWh)

CF: Conversion factor from BTU into TJ(TJ/BTU)

Simple OM can be derived using either of the following two data vintages for years y:

1. A 3-year average, based on the most recent statistics available at the time of Project Design Document (PDD) submission or (ex ante);
2. The year in which project generation occurs, if the Simple OM emission factor is to be updated based on ex post monitoring.

For this CPA, ex ante approach (a 3-year average data) is applied.

$EF_{CO2,i,y}$ in the Equation (1) is obtained by the Equation (3) as follows:

$$EF_{CO2,i,y} = CC_i \times OXID_i \times 44/12 \qquad \text{......Equation (3)}$$

Where,

$EF_{CO2,i,y}$: CO2 emission factor of fuel type i (tCO2/GJ)

CC_i: Carbon Contents of fuel type i (tC/TJ)

$OXID_i$: Carbon oxidation factor of the fuel type i (%)

Step 1-4. Identify the Cohort of Power Units to Be Included in The Build Margin (BM) .

Sample Group of Power Units

The sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

Vintage of Data

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1.

For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the Designated Operational Entity for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the Designated Operational Entity. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2.

For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For this CPA, Option 1 is applied.

Step 1-5. Calculate The Build Margin Emission Factor.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m GEN_{m,y} \times EF_{\mathrm{EL},m,y}}{\sum_m GEN_{m,y}} \quad \text{……Equation (4)}$$

Where,

$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y (tCO2/MWh)
$GEN_{m,y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$: CO2 emission factor of power unit m in year y (tCO2/MWh)
m : Power units included in the build margin
y : Most recent historical year for which power generation data is available

The CO2 emission factor of each power unit m ($EF_{EL,m,y}$) will be determined as per Step1-3. Method (a) for the simple OM using "y" for the most recent historical year for which power generation data is available, and using "m" for the power units included in the build margin.

Step 1-6. Calculate The Combined Margin (CM) Emissions Factor.

According to the above equations, the emission factor of the system power supply (combined margin, CM) is determined by the CO2 emission factor of system power supply (CEF_y). CEF is average of OM and BM described as follows:

$$CEF_y = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{……Equation (5)}$$

Where,

CEF_y: CO2 emission factor of system power supply ($tCO2_{eg}$ /MWh)
$EF_{grid,OM,y}$: Operating margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
w_{OM}: Weighting of operating margin emissions factor (%)
w_{BM}: Weighting of build margin emissions factor (%)

$w_{OM} = 0.5$ and $w_{BM} = 0.5$ for this crediting period.

According to the above equation, the emission factor of the system power supply (combined margin) for this CPA is determined by the average of OM and BM.

Table 3 Emission Factor of The System Power Supply (CEF_y)

	OM ($tCO2_{eg}$ /MWh)	BM ($tCO2_{eg}$ /MWh)	CM ($tCO2_{eg}$ /MWh)
Luzon	0.618	0.349	0.483
Visayas	0.205	0.696	0.451
Luson-Visayas	0.627	0.350	0.488
Mindanao	0.277	0.679	0.478

STEP 2. Calculation of Baseline Emissions

Baseline emissions is calculated by Equation (6).

Renewable energy generation volume (MWh) for the baseline emissions calculations was derived utilizing data with high transparency. Baseline emissions from system power supply are determined as follows with CEF_y shown in the Table 3.

$$\underset{(tCO2_{eq}/y)}{BEy_{,grid}} = \underset{(MWh)}{EG_y} \times \underset{(tCO2_{eg}/MWh)}{CEF_y} \quad \text{......Equation (6)}$$

$$\underset{(MWh)}{EG_y} = \underset{(MW)}{Electricity_y} \times \underset{(h/y)}{T_y} \quad \text{......Equation (7)}$$

Where:

Parameter	Description	Figure	Unit	Data Source
$BE_{y,grid}$	Annual baseline emissions from system power supply	Calculated by equation (6)	t $CO2_{eq}$/year	-
$Electricity_y$	Power generation capacity of installed plant	XXXX	MW	Based on the project plan of this CPA
T_y	Operation hours of installed plant	XXXX	h/y	Based on the project plan of this CPA
CEF_y	CO2 emission factor of system power supply	XXXX	$tCO2_{eg}$ /MWh	Calculated by equation (5)

(ii) Project Emissions

This CPA does not use fossil fuel within its entire activity. Therefore, project emission is zero.

(iii) Leakage Emissions

Emissions from leakage are calculated in the following cases:

- When power generation facilities are transferred from other activities, or existing power generation facilities are transferred into other activities.
- Biomass resources are used for power generation in the project activity

This CPA does not apply to either of the above cases, therefore, no leakage will be generated by the project.

(iv) Emissions Reduction of Greenhouse Gas

GHG emissions reduction is calculated as indicated in Equation (8).

$$\underset{(tCO2_{eq}/y)}{ER_y} = \underset{(tCO2_{eq}/y)}{BE_y} - \left(\underset{(tCO2_{eq}/y)}{PE_y} + \underset{(tCO2_{eq}/y)}{Leakage_y} \right) \quad \ldots\ldots \text{Equation(8)}$$

ER_y: Emissions reduction in year "y" ($tCO2_{eq}/y$)
BE_y: Baseline emissions in year "y" ($tCO2_{eq}/y$)
PE_y: Project emissions in year "y" ($tCO2_{eq}/y$)
$Leakage_y$: Emissions due to leakage in year y ($tCO2_{eq}/y$)

B.5.3. Summary of the ex-ante estimation of emission reductions:

Table 4. Summary of Ex-ante Estimation of Emission Reduction

Year	**Estimation of project activity emissions (tCO_2 e)**	**Estimation of baseline emissions (tCO_2 e)**	**Estimation of leakage (tCO_2 e)**	**Estimation of overall emission reductions (tCO_2 e)**
2010	0	XXXX	0	XXXX
2011	0	XXXX	0	XXXX
2012	0	XXXX	0	XXXX
2013	0	XXXX	0	XXXX
2014	0	XXXX	0	XXXX
2015	0	XXXX	0	XXXX
2016	0	XXXX	0	XXXX
Total (tCO_2e))	0	XXXX	0	XXXX

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

(i) Monitoring and reporting framework

Monitoring and reporting framework is shown in Figure 3 below. The operation and management of mini-hydropower generation facility is carried out by REC of XXXX (the mini-hydropower generation facility operator). Based on monitoring manual that is provided by the NEA, REC will monitor the electricity volume and will report to NEA, who will then undertake data checking, calculation of emission reduction, site visits and provision of advice to the municipalities. NEA will also be responsible for communication with Designated Operational Entity for verification procedures.

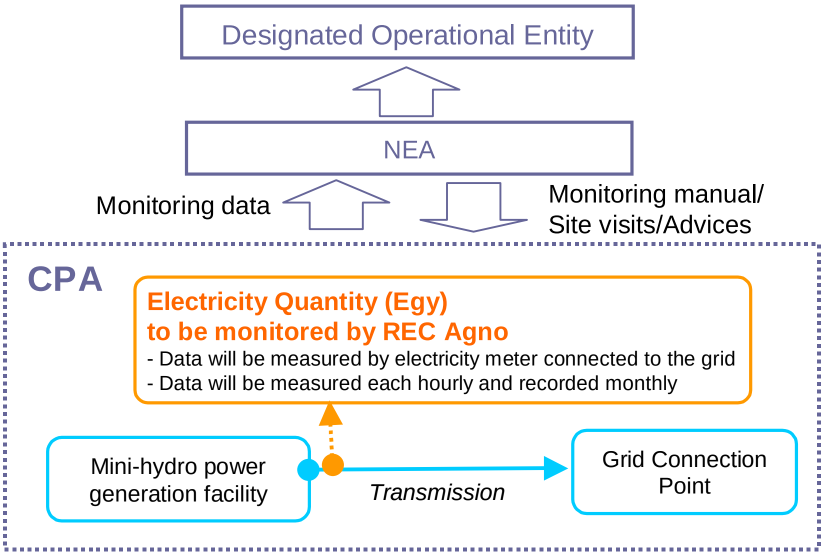

Figure 3. Monitoring plan for this CPA

(ii) Monitoring method
The detailed information of the monitoring items and their monitoring methods are described below.

Data / Parameter:	EGy
Data unit:	MWh
Description:	Electricity supplied to the grid by the project in the year y
Source of data to be used:	Measurements undertaken by the XXXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXXX
Description of measurement methods and procedures to be applied:	- Date will be measured by electricity meter connected to the grid - Data will be measured each hourly and recorded monthly
QA/QC procedures to be applied:	Periodic international calibration will be implemented. Data collected through measuring device will be crosschecked with receipts indicating the electricity generation volume.
Any comment:	Data will be kept for two years after the last issuance of CERs for this activity.

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The environmental impacts of the irrigation canals where the mini-hydropower generation facilities are to be located are expected to be very small because of he following reasons:

- CPAs under this PoA are not subject to the EIA under the regulations set forth by the Department of Environment and Natural Resources.
- The PoA installs hydropower in existing irrigation canals only. Therefore it does not cause any additional destruction of watersheds and other natural resources that have high ecosystem values and services.

- Through the removal of organic matters such as fallen leaves that accumulate in the canal system, there are positive environmental effects, while there are no known negative effects to the environment.

Furthermore, there are no transboundary environmental impacts predicted to be caused by the implementation of the hydropower facilities in the irrigation canals. Therefore, there are no transboundary impacts expected to be caused from this Project.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

This CPA utilizes the run-off-river at the irrigation canal and will not impound any water for the generation of electricity.

According to Philippines Department Administrative Order (DAO) 2003-30, hydro power generation projects that impound water for electricity generation will be classified as Category A or Category B that are required EIS or Initial Environmental Examination (IEE) report which is equivalent to an environmental impact assessment. On the other hand, hydropower generation projects that apply run-of-river system will be classified as Category D, which is applicable to the CPAs under this PoA. As shown in the Table5, Category D is considered as a project that will not result in significant environmental impacts and will not be required to submit an IEE report.

Table5. Classification of The Environmental Impact Assessment of a Newly Developed Hydropower Generation Project

Criteria for Classification	Category	Description of the Category	Documents Required to be Submitted
Impounding >= 20 million cubic meters	Category A	Environmentally Critical Projects with significant potential to cause negative environmental impacts.	-(Programmatic)EIS[*1]
Impounding < 20 million cubic meters	Category B	Projects that are not environmentally critical in nature, but which may cause negative environmental impacts because they are located in environmentally critical areas	-IEE[*2] or IEE Checklist[*3] (if available)
Using run-of-river system **(Applicable to this CPA)**	Category D	Projects not falling under other categories OR unlikely to cause adverse environmental impacts	Project Description[*4]
Power generation plant ess than 1MW capacity **(Applicable to this CPA)**			

*1: Environmental Impact Statement (EIS) - the document of studies on the environmental impacts of a project including the discussions on direct and indirect consequences upon human welfare and ecological and environmental integrity. The EIS may vary from project to project but shall contain in every case all relevant information and details about the proposed project or undertaking, including the appropriate mitigating and enhancement measures to address the identified environmental impacts.

environmental impacts of co-located projects with proposals for expansions. The PEPRMP should also describe the effectiveness of current environmental mitigation measures and plans for performance improvement.
*2: Initial Environmental Examination (IEE) - the document required of proponents describing the environmental impact of, and mitigation and enhancement measures for, non critical projects or undertakings located in an environmental critical area.
*3: Initial Environmental Examination (IEE) Checklist - a short and simplified checklist version of an IEE prescribed by the DENR and required to be filled up by proponents for describing the project's environmental impact and corresponding mitigation and enhancement measures for non-critical projects located in an environmental critical area. The DENR prescribes appropriate corresponding IEE Checklists for different projects with minimal and manageable impacts.
*4: Project Description (PD) – document, which may also be a chapter in an EIS, that describes the nature, configuration, use of raw materials and natural resources, production system, waste or pollution generation and control and the activities of a proposed project. It includes a description of the use of human resources as well as activity timelines, during the pre-construction, construction, operation and abandonment phases.

For the projects under Category D, Project Description (PD) should be submitted. Within the PD, an Environmental Management Plan (EMP) at the CPA level must be presented including items described in Table6.

Table 6 Recommended Contents of Project Description

Chapter	Contents
I. Introduction	
II. Project Description	A. Project Rationale
	B. Proposed Project Location
	C. Description of Project Operations -Process flow -Material and energy balance -Production capacity and descriptions of raw materials, by-products, products and waste materials
	D. Description of Project Phases -Pre-construction/Operational phase -Construction phase -Operational phase -Abandonment phase
	E. Project Capitalization and Manpower Requirement
III. Environmental Management Plan (EMP, Discussion of the residual management scheme among others)	A. Air
	B. Water
	C. Land
IV. Attachment	

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☒ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

As indicated in the proposed PoA, interviews with the stakeholders at the PoA level were conducted. They were given the opportunity to discuss and provide comments to the PoA.

In addition to the interviews at the PoA level, comments from responsible persons of local agencies and citizens who are specifically related to the Project will be collected at a later date through interviews at the CPA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Local citizens and agencies were/will be invited to participate in interviews where they will receive information on the objectives, process, implications and benefits for sustainable development of the CPA. Representatives from the local office of the Department of Environment and Natural Resources (DENR) and NIA may also be present at the consultation. Comments from local citizens will be invited and compiled during this time.

D.3. Summary of the comments received:

Comments from local citizens and related agencies are summarized here.

Summary of the comments received from the interviewees.

D.4. Report on how due account was taken of any comments received:

The report on how the comments are received will be described here.

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

Detail baseline information is described in Section E.

Table 7 Electricity Statistical Data of the XXXX Grid

	2003	2004	2005	2006	2007	Average of 2005-2007 (3years)	Proportion 2003-2007 (5years)
Coal							
Oil-Based							
Combined Cycle							
Diesel							XX%
Gas Turbines							
Oil-Thermal							
Natural Gas							
Geothermal							
Hydro							XX%
Other Renewble							
Total (GEN_y)							100%

Source: Department of Energy, Philippines

Table 8 Heat Rate

Type of Fuel	BTU/kWh
Combined Cycle	6,550
Diesel	8,900
Gas Turbine	14,400
Oil Thermal	8,600
Coal	8,900
Natural Gas	6,550

Source: Department of Energy, the Philippines

Table 9 Carbon Contents of Each Type of Fuel (CC_i)

Type of Fuel	CC_i(tC/TJ)
Gas/Diesel Oil	20.20
Residual Fuel Oil	21.10
Other Bituminous Coal	25.80
Natural Gas	15.30

Source: 2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4

Table 10 Combustion Efficiency($OXID_i$)

Type of Fuel	Combustion Efficiency
For all type of fuel	1.00

Source: 2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4

Table 11 OM Calculation Data (Simple OM or Average OM, XXXX Grid)

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Item	Electricity Generation (2005-2007)	Heat Rate	Conversion Factor	Fuel Consumption Impact	Carbon Contents	Oxidation Factor	CO2 Emission Factor	Annual Carbon Dioxide Emission	Simple OM or Average OM CO2 Emission Factor
Abbreviation	GEN	Heat Rate	-	-	CC	OXID	EFCO2	-	$EF_{grid,Omsimple}$ or $EF_{grid,OM-ave,y}$
Data Source	PDOE Powerstats	PDOE	CF	(A)x(B)x(C) x1000	IPCC	IPCC	(E)x(F)	(D)x(G)	(H)/(A)
Unit	MWh/yr	BTU/kwh	TJ/BTU	TJ/yr	tC/TJ	-	tCO2/TJ	tCO2/yr	tCO2/MWh
Coal		8,900	$1.055*10^{-9}$		25.8	1.00	94.6		
Oil based									
Combined Cycle		6,550	$1.055*10^{-9}$		20.2	1.00	74.1		
Diesel		8,900	$1.055*10^{-9}$		20.2	1.00	74.1		
Gas Turbine		14,400	$1.055*10^{-9}$		20.2	1.00	74.1		
Oil Thermal		8,600	$1.055*10^{-9}$		21.1	1.00	77.4		
Natural Gas		6,550	$1.055*10^{-9}$		15.3	1.00	56.1		
Total									

Table 12 Most Recently Built Power Plant Data Used for BM (XXXX Grid)

Plant Name	Rated Cap (MW)	Plant Type	2004	2005	2006	Electricity Generation in 2007	Original Year Commissione
Total							
Proportion within the grid:		*XX%*					

Source: Data Provided by Department of Energy, Philippines

Table 13 BM Calculation Data (XXXX Grid)

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Item	Electricity Generation (2007)	Heat Rate	Conversion Factor	Fuel Consumption Impact	Carbon Contents	Oxidation Factor	CO2 Emission Factor of	Annual Carbon Dioxide	BM CO2 Eemission Factor
Abbreviation	$GEN_{m,i}$	Heat Rate	-	-	CC	OXID	EF_{EL}	-	EF_{gridBM}
Data Source	PDOE Powerstats	PDOE	CF	(A)x(B)x(C) x1000	IPCC	IPCC	(E)x(F)	(D)x(G)	(H)/(A)
Unit	MWh/yr	BTU/kwh	TJ/BTU	TJ/yr	tC/TJ	-	tCO2/TJ	tCO2/yr	tCO2/MWh
Coal		8,900	$1.055*10^{-9}$		25.8	1.00	94.6		
Oil based									
Combined Cycle		6,550	$1.055*10^{-9}$		20.2	1.00	74.1		
Diesel		8,900	$1.055*10^{-9}$		20.2	1.00	74.1		
Gas Turbine		14,400	$1.055*10^{-9}$		20.2	1.00	74.1		
Oil Thermal		8,600	$1.055*10^{-9}$		21.1	1.00	77.4		
Natural Gas		6,550	$1.055*10^{-9}$		15.3	1.00	56.1		
Geothermal									
Hydro									
Other renewables									
Total									

Annex 4

MONITORING INFORMATION

Refer to Section B.6.1 for the Monitoring Information.

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