CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

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Philippines Mini-Hydro PoA.
Version 10.0
Dated 15/10/2012

A.2. Description of the small-scale programme of activities (PoA):

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1. Policy/measure or stated goal of the PoA

Land Bank of the Philippines (LBP), established in 1963, is the official Philippine government depository bank. Its mission is to promote growth and development especially in the countryside where resources are scarce and a majority of the poor reside. LBP has taken the lead in extending financial assistance to its priority sectors, particularly 1) small farmers and fisherfolk cooperatives, 2) micro, small and medium enterprises, 3) agri-infrastructure and agribusiness, and 4) environment-related projects.

The goal of the Philippines Mini-Hydro PoA is to implement small scale hydropower plants in the Philippines and displace fossil-fuel based electricity generation.

The Coordinating/Managing Entity (CME) of the PoA is the Land Bank of the Philippines (LBP). In its function as a commercial bank, the CME supports the programme beyond the coordination of the CDM component, as it also provides financing to participating entities in the form of loans. LBP decision on developing a PoA rather than a regular CDM mini-hydro project lies on the fact that a PoA aggregates many small project units over time under a common umbrella. It gives small and dispersed activities and projects, which would not be feasible under the traditional stand-alone approach, a chance to participate and benefit from the CDM in a complete voluntary base. This PoA is part of a voluntary initiative on LBP's side to catalyze clean technology investments in the country through CDM. This initiative was commenced in November 2006 through the establishment of LBP's Carbon Finance Support Facility (CFSF).

For this PoA, LBP will also act as the Coordinating and Managing Entity (CME) entity in charge of CPAs' inclusion, validation and verification activities in addition to aggregating project information and monitoring data for this purpose.

The project units under each CPA will be implemented by project owners themselves that meet the criteria outlined in this PoA. These project owners will operate the mini-hydro projects and have agreements with LBP on the carbon finance transaction including their role in on-the-ground monitoring, quality control and reporting in accordance with the CDM rules.

Major activities under the PoA are as follows:

- Promoting investment in small hydropower plants;
- Use of certified emission reduction (CER) revenues to improve economic viability of the hydropower plants and facilitate the access to the CDM for the developers of hydropower stations;
- Provide loans for investments in mini-hydropower plants;

Project participants will be public and private sector entities in the Philippines. Eligibility is size-limited to projects of a maximum of 15 MW. This includes both micro- and mini-scale hydropower plants. This is in-line with the threshold defined under the PoA's eligibility criteria. According to the definition of the Philippine Department of Energy, mini-hydropower plants are in the range of 101 kW – 10 MW, and micro-hydropower plants are 100 kW and below. [1]

2. General operating and implementing framework of PoA

The large potential for the development of mini-hydropower in the Philippines is still largely untapped. The total untapped hydropower resource potential of the country is estimated at 13,097 MW.[2]

The potential of mini-hydropower (MHP) in the Philippines is estimated at 1,847 MW plus 27 MW of micro-hydropower. The Philippines is trying to accelerate the investment in mini-hydropower, especially from the private sector. To this end, the government has put a variety of incentives into place. However, despite these incentives, the mini-hydropower sector only slowly gains momentum.

The regulations issued by the Philippines include the following:

Renewable Energy Act of 2008. Under this Act, provisions have been made to favor electricity generated by renewable energy projects through among others:

1. New fiscal incentives, notably:
   - tax exemption on sale of carbon credits;
2. Non-fiscal incentives:
   - mandatory utilization of RE by grid operators;
   - priority connection to the grid and priority purchase and transmission of RE electricity generation by grid operators;
   - fixed tariff guarantee for at least 12 years by grid operators (under preparation);
   - end-users' option to purchase electricity from RE sources;
   - priority ("must") dispatch for intermittent RE sources including hydro; and
3. Institutional and implementation framework:
   - creation of the Renewable Energy Management Bureau; and
   - facilitation of Environmental Compliance Certification (ECC) (fast track).

Mini-Hydroelectric Power Incentives Act of 1990 (Republic Act No. 7156). It includes the following incentive schemes:

- seven-year income tax holiday, and a favorable tax rate thereafter;
- duty-free import of equipment and tax credit on domestic capital equipment;
- value-added tax exemption on domestic purchases of goods and services; and

[1] The Philippine Department of Energy, http://www.investphilippines.gov.ph/downloads/sector/Renewable%20Energy.pdf

[2] Department of Energy: http://www.doe.gov.ph/ER/Hydropower.htm, accessed 05 November 2011.

- special realty tax rate on equipment and machinery.

3. Voluntary action

There is no law, regulation or government mandate that requires LBP as the CME of the proposed PoA or the participating project units to undertake this activity.

Likewise, there is no law, regulation or government mandate that would require any public or private entity to develop, implement and operate a mini-hydropower project in the Philippines. LBP confirms that doing so would be a voluntary activity for all participants, undertaken within the incentive framework provided by the government, with the intention to make a profit, and to be good corporate citizens.

4. Sustainable development benefits

Currently, the demand for electricity in the Philippines is rising as an essential requirement for poverty eradication and GDP growth. As the energy mix traditionally largely relies on imported fossil fuels, the Government of the Philippines attaches great importance to the development of domestic renewable energy sources to foster the sustainable development of the country. Exploiting the vast untapped hydroelectric potential estimated at over 13,000 MW is an important pillar in this strategy.[3] The proposed PoA is in line with the policy of the government as it promotes the mini-hydroelectric power sector.

The mini-hydro sector accelerates local development through the creation of jobs during construction and operation of the hydropower plants. In many cases, the construction of access roads for the hydropower plant improves the market access for local farmers and facilitates the transportation of goods. According to the "Renewable Energy Act of 2008", the operator of the hydropower plant has to channel 1% of gross revenues back to the government.[4] Mini-hydropower plants also help alleviate local electricity shortages, especially in small island grids that are mainly fuelled with small diesel power plants. At the same time, it provides clean energy without the large socio-economic and environmental impacts that sometimes are involved when large hydroelectric projects are undertaken.

The following table demonstrates the crucial milestones carried out through the development of this PoA.

Table 1. Milestone through PoA development

Date	Event
November 2006	LBP Management Committee approved the establishment of "Carbon Finance Support Facility"
December 28, 2008	Signing of Memorandum of Understanding between LBP and KfW for the development of PoA, including PIN development and PDD preparation
February 23, 2010	Completion of the first versions of PoA-DD and CPA-DD prepared by Mr. Sidney Thomas
November 24, 2010	CFSF Reply Form / Intent from ANTECO
March 2011	Signing of Term Sheet between LBP and KfW
September 20, 2011	Signing of ERPA between LBP and KfW

[3] See Official Website of the Philippine Department of Energy, Energy Resources – Hydropower, http://www.doe.gov.ph/ER/Hydropower.htm, accessed 29 August 2011.

[4] Republic Act No. 9513

[6] The Philippines map issued by the CIA, last updated on 11 July 2012

Date	Event
September 23, 2011	Completion of POA-DD and CPA-DD prepared by Climate Focus
September 29, 2011	MOA signing between LBP and ANTECO for the intent to purchase and sell the CERs
October 1, 2011	Posting of POA-DD and CPA-DD on UNFCCC website for global stakeholders' consultation
October 25-28, 2011	Validation Activity

A.3. Coordinating/managing entity and participants of SSC-POA:

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The Coordinating/Managing Entity (CME) is the Land Bank of the Philippines (LBP). LBP is well positioned to serve as a CME for this PoA as it is familiar with the Philippine renewable energy sector, has staff dedicated to the promotion of the CDM and has the capacities required to coordinate the project.

Name of Party involved ((host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
The Philippines (Host)	Managing entity: Land Bank of the Philippines (LBP) (Public)	No
Germany	Kreditanstalt für Wiederaufbau (KfW) (Public)	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

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The location of the PoA is the Philippines. The actual location of each hydropower plant will be recorded after it has been implemented. LBP will maintain an up-to-date database of all plants.

Map 1: Map of the Philippines[6]

A.4.1.1. Host Party(ies):

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The Host Party is the Philippines acting through its Department of Environment and Natural Resources (DENR) that serves as the DNA for CDM operations.

A.4.1.2. Physical/ Geographical boundary:

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The geographical boundary of the PoA will be the Philippines.

Central geographical coordinates are: N 13.5933, E 121.8689[7]

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

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A typical CPA would comprise of one or more hydroelectric power plants/units either with a run-of-river reservoir, an accumulation reservoir that: (a) Install a new power plant at a site where there was no hydro

[7] http://www.namria.gov.ph/prs92/Downloads/PDF/Station%20Balanacan%20Primer.pdf

power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s).

The actual size of the CPA will be determined on the basis of the installed capacity of the plants as not to exceed the small scale threshold.

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

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The technology used in each of the CPAs under this PoA is mini-hydropower plants of up to 15 MW installed capacity, grid-connected, in a Greenfield/existing run of river hydropower plant with or without reservoir / a hydropower plant with a dam and a new reservoir / a hydropower plant on an existing reservoir /involve a capacity addition/ involve a retrofit of (an) existing plant(s) / Involve a replacement of (an) existing plant(s).

The hydropower plants with reservoir will satisfy the conditions mentioned in AMS-I.D., version 17 under paragraph 4. Each plant unit would generally comprise the following main elements which will be explained in more details in each CPA-DD documents:

1. Dam spillway, to divert a portion of river flow to the powerhouse (with or without reservoir);
2. Headrace and penstock to convey water-flow to the turbines and generators in the powerhouse;
3. Powerhouse to convert water flow into electric power through the use of turbines and generators;
4. Switchyard to connect power generated at the powerhouse to the grid; and
5. Transmission line to connect the switchyard to the grid.

In some cases, it will be necessary to build access road(s) to the dam site. In addition, in some cases preventive environmental measures such as tree planting will be required. Hydropower units will be grid-connected as per the definition in the methodology.

Depending on the local hydro-geological specifications and local manufacturing capacities, the equipment may be imported or supplied locally. Further technical parameters that will be elaborated under each CPA comprise the following:

Parameter	**Unit**
Power capacity	kW
Number and type of turbines	No.
Plant Load Factor (PLF)	%
Annual electricity generation	GWh/yr
Gross head	m
Head loss	m
Net head	m
Intake height/length	m/m
Headrace line length/diameter	m/m
Penstock line length/diameter	m/m
Transformer capacity	MVA

Voltage conversion	KV

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

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The eligibility criteria for enrolling CPAs under this program are defined in accordance with "Standard for the Development of Eligibility Criteria for the Inclusion of a Project Activity as a CPA Under the PoA, Version 01.0":

Criteria	Documentation to substantiate compliance
Each CPA[8] is located in the Philippines. Areas that are ineligible for hydropower development per government decree are excluded.	Compliance to this criterion shall be verifiable through one or more of the following documents per CPA: – Project design features and location of the plant within the Feasibility Study Report(s); – Technical sheet of the unit(s); – Environmental Impact Assessment report(s); – Other credible documents;
Each CPA can be uniquely identified and defined in an unambiguous manner by providing the geographical coordinates, and the serial number of the turbines and generators at each location.	Project coordinates as of feasibility study report
Each plant listed in the CPA uses hydropower technology with or without a reservoir, and its technical definition meets the requirements and restrictions applicable to SSC methodology AMS-I.D. version 17[9].	Project design of plants included in the CPA
The CPA does not exceed the small scale limits for Type I projects	Project design of plants included in the CPA
The start date of the CPA (earliest starting date of the first unit) does not occur before the validation commencement	Starting date evidence of the units within the CPA.

[8] Here and elsewhere, references to "CPA" should be taken to mean "SSC-CPA". The short form is used for sake of brevity.

[9] Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories, Type I.D: Renewable Energy Projects, Grid-Connected Renewable Electricity Generation.

Each CPA demonstrates additionality as detailed and elaborated in the CPA-DD document in line with section E.5.1. and E.5.2. of the PoA-DD document.	Section B.3 of the CPA-DD shall demonstrate the additionality based on credible and verifiable evidence including but not limited to: – Feasibility Study Report(s); – IRR calculation spreadsheet(s) without CDM revenue; – Technical sheet of the unit(s); – Environmental Impact Assessment report(s); – Other credible documents;
The CPA is not registered as a separate CDM project activity, or as a participating CPA under another PoA.	LBP CFSF Reply Form with confirmation statement by each MHP owner.[10]
The CPA meets Philippine requirements for social and environmental approval.	Copy of the application for Environmental Compliance Certificate (ECC) or Certificate of Non-Covergae (CNC)
The owners of all hydropower plants listed in the CPA have signed an agreement in which it allows LBP to market the emission reductions from the installation and operation of the plant.	Signed MOA between LBP and the owner of each MHP plant
The conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys;	There is no sampling/surveys involved in the monitoring plan nor baseline establishment of each CPA
Each CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA; Since AMS-I.D is applied: I. In case the CPA does not apply microscale additionality: the CPA's power capacity in aggregate shall remains below 15MW throughout the crediting period. II. In case the CPA applies microscale additionality: the CPA's power capacity in aggregate shall remains below 5MW throughout the crediting period.	The aggregated capacity of each CPA shall be verifiable through one or more of the following documents: – Feasibility Study Report(s); – Technical sheet of the unit(s); – Environmental Impact Assessment report(s); – Other credible documents;
The project must have undertaken a stakeholder consultation as outlined in Section D.	Documentation on the invitation to the stakeholder consultation, list of attendees and minutes of the meeting

[10] For more details see section A.4.4.1. Operational and management plan

Real[11] action on CPA level begins after the start of validation of the PoA.	Documentation on project implementation
The plants within the CPA are not part of a debundling (debundling check).	Debundling check has been carried out on CPA level in accordance with the latest "Guidelines on assessment of debundling for SSC project activities".
Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance.	Official confirmation from fund providers.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

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(i) The proposed PoA is a voluntary coordinated action

There is no law or regulation in the Philippines that requests the installation in hydropower plants or mandates investors to meet renewable energy quotas.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA

The project proponents chose to demonstrate additionality on CPA-level. This is valid as the barriers are specific to the situation and characteristics of the project units.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced

Not applicable as the PoA is not the implementation of a mandatory policy.

(iv) If a mandatory policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

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The overall operation and management of the PoA will be led by the Head of Environmental Program and Management Department (EPMD), who acts as the Program Director of the Carbon Finance Support Facility (CFSF) and CME Director.

[11] The notion of "real" project implementation excludes project planning. Real project implementation begins when, for example, a contract has been awarded to begin construction.

The CME shall have the competencies to check the features of potential CPAs and ensure that each CPA meets all requirements and eligibility criteria before inclusion in the registered PoA. The CME shall develop and implement a management system that includes the following made available to the DOE at the time of validation of the PoA (EB 70, Annex 5, paragraph 19):

a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;
b) Records of arrangements for training and capacity development for personnel;
c) Procedures for technical review of inclusion of CPAs;
d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA);
e) Records and documentation control process for each CPA under the PoA;
f) Measures for continuous improvements of the PoA management system;
g) Any other relevant elements.

a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies:

The process of inclusion of CPAs to PoA and all the communications between LBP (as the CME) and the CPA project owners shall be undertaken by the Environmental Program Management Unit (EPMU) under the supervision of the Head of EPMU, the PoA Manager and Program Manager of the CFSF.

The EPMU is composed of several account officers and is led by the PoA Manager (see Figure 1); each personnel has specialties and competencies in marketing, technical, engineering/O&M, and information system management. Due to multi-disciplinary nature of the inclusion process, it will be a collective effort among the EPMU personnel.

Evaluation of prospective CPAs, including collection of relevant information of the prospective CPAs and control of their compliance with the eligibility criteria shall be undertaken by one of the account officers under the supervision of the PoA Manager. Records of all the communications and documents such as the CFSF Reply Form and the Memorandum of Agreement (MOA) between the CME and the CPA project owner will be maintained by the said account officer.

Conduct of the CPAs' eligibility criteria and de-bundling check, environmental due diligence and other technical activities shall be undertaken by a joint effort of the accounts officers under the supervision of the PoA Manager..

Project database of the PoA shall be maintained by the designated Management Information System (MIS) officer of the EPMU. The MIS officer shall be responsible in assigning unique numbers for each prospective CPAs. The MIS officer shall collect all relevant reports and performance data from all the officers and reports it to the PoA Manager on monthly basis.

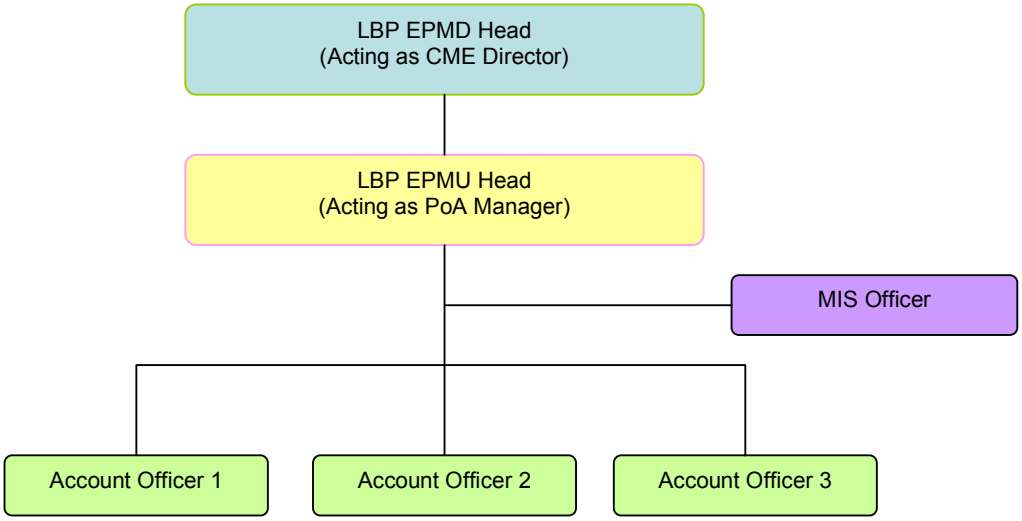

Figure 1. Organizational structure within the LBP (as the CME) for the inclusion of CPAs

b) Records of arrangements for training and capacity development for personnel;
LBP will ensure that annual training and capacity development workshops are held for the personnel. Also any new personnel hired will undergo training and orientation workshop. Record of such will be made available to DOE on request.

c) Procedures for technical review of inclusion of CPAs;
Technical review for inclusion of new CPAs will be carried out by the account officers of EPMU under the supervision of the PoA manager. The tasks for above will include those mentioned in the eligibility criteria.

d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA);
An identification system will be implemented that uniquely identify each power plant under the CPA. This serial numbering system will be used to record baseline and monitoring data on a continuing basis.

The CPA will entail information on each power plant as follows:

- Name of the power plant and CPA
- Name of the implementing entity of the CPA
- Contact details of the owner of the power plant including contact person, address, telephone, fax and e-mail
- Location of the power plant (GPS coordinates)
- Serial numbers, installed capacity and other relevant technical specifications of each hydro power plant participating in the PoA.

The database described above will be used to perform a double accounting check. Every new CPA and involved power plants will be compared to the already existing database and the list of project activities that are under validation or registered at the UNFCCC.

e) Records and documentation control process for each CPA under the PoA;

Each CPA shall be assigned with a unique number in the LBP database. Related documents such as the CFSF Reply Form, communication letters and MOA shall be kept and maintained by EPMU in folders bearing the same unique number.

LBP shall keep / archive the monitoring reports in electronic and printed formats. Archived electronic files shall be stored in compact discs. The database provides the backbone of the emission reduction calculation thus the database will be complete and accurate.

The process for documentation management of the PoA, and CPAs therein, is outlined in Figure **2** below.

Figure 2. The process for documentation management of the PoA, and CPAs

The database has three objectives:

1. Recording the number of MHPs and aggregated capacity of the systems in operation in each CPA,
2. Keeping up-to-date information and performance data on the location and capacity in operation of each system,
3. Avoiding double-counting of systems.

f) Measures for continuous improvements of the PoA management system;

The MHP plant operator shall assign at least one monitoring technician responsible for data collection and recording and one monitoring officer to check the consistency and approval of the data daily. It is not possible to have one person covering both of the responsibilities. The tasks and responsibility of the monitoring technician and officer are described under section E.7.2.

g) Measures for continuous improvements of the PoA management system;

Every year, a meeting between the CME represented by the PoA manager including the involved Officers and CPAs (project owners) shall be held with the following agenda:

1. Summarising the previous year and discussing the major developments;
2. Discussion of goals and whether they have been achieved;
3. If not achieved, various reasons that can be attributed to the above;
4. Comments will be collected from CME member and power plant owners and discussed; and
5. Agenda and targets for the coming year.

h) Any other relevant elements:

First step for inclusion under the PoA: An interested project owner shall sign the LBP CFSF Reply Form to participate in the PoA; this form will be the first intention of agreement between CPA and CME. After the CFSF Reply Form is signed, LBP will brief the proponent on the criteria for inclusion, and will proceed by collecting an initial round of information, enough to assess that the proposed project meets the eligibility criteria as set out by the PoA. The project owner shall submit a letter- statement indicating that they are not part of another registered CDM project or another registered PoA, nor are they conducting validation under any other CDM project.

If the proposed project meets the eligibility criteria, a unique number within LBP record keeping system will be assigned, that will be associated with the project implementer, the project location, geographical coordinates, technical and financial information of the CPA, and feasibility study, among others. Under the supervision of the PoA manager, one of the officers will confirm the information provided by the project owner that the CPA is not a component of another CDM programme or had been registered as a project activity of another CDM project by double checking the project name and location with the Philippine DNA and available records on the UNFCCC website.

Subsequently, a MOA will be signed outlining the relative responsibilities for the development of the project to meet basic technical and financial criteria under the CDM. The MOA will include an initial agreement on the exclusivity and authorization to sell the CERs to a Carbon Buyer and will elaborate on the roles of each entity during PoA operation.

After the MOA is signed, LBP will discuss with the proponent the additional documentation and monitoring requirements of the PoA and begin collecting the detailed project information necessary to finalize the CPA-DD. This will include collection of relevant CDM documentation, analysis and identification of emission reduction potential.

*De-bundling check:*_LBP will check whether the project units within the CPA are a de-bundled component of a larger project by using *"Guidance for Determining the Occurrence of Debundling Under a Programme Of Activities (PoA)".*[12]

This check is necessary as small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. For the purposes of registration of a PoA a proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity which satisfies both conditions (a) and (b) below:

[12] EB54, Annex 13

a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;
b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

If each of the independent mini/micro hydro power plants included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied (15 MW) then that CPA of PoA is exempted from performing de-bundling check (i.e. considering as not being a de-bundled component of a large scale activity).

Inclusion in PoA: After the necessary information and documentation requirements have been met, LBP reviews the project for elaboration of the CPA as per registered CPA-DD template and completes the CPA-DD. Once cleared by CFSF internal procedures, LBP submits the CPA-DD and other relevant information to the DOE for their review and inclusion as per the rules and procedures for PoAs.

After inclusion in the PoA: After the DOE confirms that the CPA is eligible for inclusion in the PoA, LBP finalizes the arrangements for carbon finance application through a sub-project agreement (SPA) with the MHP plant operators, as well as the monitoring arrangements as per the registered CPA-DD template. The SPA contains the assignment of rights of CERs and will delineate the role of LBP as the Coordinating/Managing Entity (CME) for CDM validation and verification, as well as the role of each plant operator in monitoring and verification, provision of carbon finance, and financial arrangements for lending (as applicable). During project activity operation, the monitoring plan (as outlined in Sections A.4.4.2 and E.7.2) will be implemented by LBP and the plant operator, as guided by LBP. Training will also be provided at this time covering data monitoring and recording, reporting, internal quality control, operation, calibration, and maintenance.

Data management: LBP will maintain the records for the PoA as a whole. This includes a list of all projects that are under review for inclusion in the PoA and approved for inclusion in the PoA and the status of verification. The database will include the major project features important for identifying the CPA and calculating the emission reductions. This will cover documentation to ensure no double counting occurs in the claiming of emission reductions including a listing of the location (GPS coordinates), ownership and a copy of the letter of confirmation from the CPA operator concerning whether the CPA is a debundled component of another CPA or CDM programme or project activity. Monitoring data will also be included on the database which will be updated regularly based on the reports provided by the CPAs and used to calculate the emission reductions in the database.

A.4.4.2. Monitoring plan:

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The MHP plant operator shall assign at least one monitoring technician responsible for data collection and recording and one monitoring officer to check the consistency and approval of the data daily. It is not possible to have one person covering both of the responsibilities. The tasks and responsibility of the monitoring technician and officer are described under section E.7.2.

The parameters included in the monitoring plan shall be monitored and recorded for each of the mini-hydro power plants independently. Monitoring is implemented on CPA-level and is the responsibility of

each project implementer with guidance by LBP. Monitoring reports will be prepared separately for each of the CPAs for the purpose of verification and request for issuance of CERs. A database for all the CPAs shall be maintained by LBP and data will be recorded and kept for at least 2 years. LBP has designed the following procedures which will be followed by the project implementers:

Monitoring and Measurements

1. Follow the monitoring procedures, as provided by LBP
2. Simultaneously follow the calibration procedure
3. Any problems encountered in the implementation of the monitoring procedures or maintenance will be recorded in order to take into account any unintended emissions by the project activities
4. All reported data will be recorded within the LBP database
5. Procedure for quality assurance and quality check will be followed to provide for more accurate monitoring.

Reporting and Verification

1. LBP as the CME will train the CPA implementers on how to gather all the necessary information from their database to be included in all the monitoring reports for CPAs
2. LBP will conduct quality checks on monitoring reports by making spot checks on consistency for the provided data within the monitoring reports, with data provided on semi-annual visits by LBP staff.
3. As per the procedures for registration of the PoA, LBP will make available all monitoring reports requested by the DOE for verification purposes. From these, the DOE will select a sample to evaluate for verification purposes as indicated below.

For verification purposes and following the references used in the latest guidance available from the CDM Executive Board (CDM EB)[13] on statistically sound sampling methods to be used by DOEs, the simple random sampling method may be used by the DOE, where the sample size will be calculated as per Cochran's sample size formula for categorical data.

All CPAs will be monitored by the project implementers where Monitoring Reports will be recorded by LBP and it will all be made available to the DOE for verification. LBP will be the main interlocutor with the DOE and will take responsibility for making sure all records are being kept by the CPA implementers for all monitored data, and will be in charge of conducting quality checks on the emission reduction estimates for each CPA to be then reported to the DOE.

In particular, LBP's roles are:

Data Aggregation: Monthly, LBP through their local Lending Centers will receive monitoring reports. The data will be checked for completeness and quality and placed in a central database located at the LBP Head Office – Environmental Program and Management Unit (EPMU) that includes all projects under the PoA. Hardcopies of the monthly reports will also be kept on file.

Field visits: LBP will undertake bi-annual field visits, at which necessary training for operational staff at project sites will be undertaken. This will serve as an additional check of the monthly monitoring report,

[13] Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, Version 03.0, EB 69, Annex 4

[15] See Philippine Power Statistics published by the Philippine Department of Energy, on http://www.doe.gov.ph/EP/Powerstat.htm, accessed 14 July 2011.

to view the operation of the installed monitoring devices to ensure they are working properly and a means of following up on any questions on the data and any monitoring issues.

Calculation of emission reductions: LBP will use the aggregated data to calculate the emission reductions achieved based on the formulas for emission reduction calculations outlined in AMS I.D. This database will be updated monthly based on the reports received.

Cataloging CPAs to prevent double counting and status of verification: In addition to including the calculation of emission reductions, the database will catalog each individual project and whether the data provided has been verified. Information, including names of project owners and specific project locations will be included in the database and documents to be verified to provide a transparent and verifiable means of preventing double counting.

Training and outreach: LBP will hold a training program for all employees involved in the programme on PoA and CPA level. The training on PoA level will be given to the employees within the PoA team at LBP headquarters in Manila and other LBP branches if applicable. The training on CPA level will be given on the bi-annual field visits scheduled by LBP to each hydropower unit. At each plant, the project owner will ensure that only trained staff will work in the project. The training program's content will depend on the trainee's background and the function to which each will be assigned. Depending on each staff member's assignment, they will receive comprehensive information on the general and technical aspects of the equipment. The technology suppliers will be requested to provide instructions and training to the project staff on the installation, operation, maintenance and calibration of monitoring equipment. Over time, as staff members change, new employees will be trained by existing staff on these topics.

AMS-I.D. ver 17, provides that monitoring shall consist of monitoring the net electricity supplied to the grid. In addition, the requirements of ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" to monitor project emissions from reservoirs of hydropower stations apply to projects with a power density of $4W/m^2$ up to $10W/m^2$. Data measured at the power plant shall be cross-checked with records on the sale of electricity. Sampling as a means of estimating CER claims for the PoA as a whole would not be used; rather 100% data returns from each project unit would be required for the final calculation and verification of emission reductions. While the recording of electricity production, maintenance of the meters, calibration etc. is the responsibility of the operators of the hydropower plants, LBP will supervise and coordinate the activities on PoA level. These activities will include:

1. Request each CPA to establish organizational structures, measurement protocols and data storage procedures necessary for monitoring and supervises the implementation of the activities.
2. To ensure that the monitoring procedure for each CPA is implemented as mentioned in the monitoring plan in accordance with the monitoring methodology. The precision in data measurement, frequency and calibration criteria shall be checked periodically.
3. Ensure that the data generated at project level is uploaded to a centralised data management system at a set frequency and in an appropriate format. LBP will check the data for potential inconsistencies and further process it for monitoring reports and verification.
4. Electronically store the monitoring data and hold it available for two years after the end of the crediting period.

A.4.5. Public funding of the programme of activities (PoA):

>>

There is no public funding at the level of the PoA, and none will be sought. Fund provider(s) will provide letter(s) confirming that provided funds will not cause any diversion to ODA money from the relevant party(ies).

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

>>
The starting date of the PoA is 01 October 2011.

B.2. Length of the programme of activities (PoA):

>>
Twenty-eight (28) years

SECTION C. Environmental Analysis

>>

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:

- Environmental Analysis is done at PoA level ☐
- Environmental Analysis is done at SSC-CPA level ■

As potential environmental impacts are specific to the characteristics and location of each hydropower station and countermeasures have to take place on project level, the proponents of the PoA decided to conduct the environmental analysis on CPA level.

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

>>

N/A. This will be done at CPA level.

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

>>

Under Philippine Law, a hydroelectric plant of size 5 MW and up (i.e., covered project) is required to secure an Environmental Clearance Certificate (ECC) per the Revised Procedural Manual for the DENR Administrative Order 2003-30 (DAO 2003-30), hydroelectric plants of sizes between 5 MW to 30 MW are required to submit an Initial Environmental Examination (IEE) to secure an ECC. from DENR before it may be built.

On the other hand, hydropower plants with sizes smaller than 5 MW are considered non-covered projects under the Philippine EIS System, hence an ECC is not required for these hydropower plants to be built. In this case, the CPA owner will request for a Certificate of Non-Coverage (CNC) from DENR.

It will be necessary for the CPAs to be included in the proposed PoA to provide to LBP current compliance with the law, i.e. ECC for covered projects, CNC for non-covered projects, or proof of application of ECC/CNC, for inclusion into the PoA.

SECTION D. Stakeholders' comments

>>

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

- Local stakeholder consultation is done at PoA level ☐
- Local stakeholder consultation is done at SSC-CPA level ■

As potential social impacts are specific to the characteristics and location of each hydropower station and countermeasures have to take place on project level, the proponents of the PoA decided to conduct the stakeholder consultation on CPA level.

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

>>

N/A. This will be done at CPA level

D.3. Summary of the comments received:

>>

N/A. This will be done at CPA level

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

>>

N/A. This will be done at CPA level

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

>>

AMS-I.D: Small-scale activity -- AMS Type I -- "Renewable Energy Projects" -- Category D ("Grid connected renewable energy generation -- Version 17").

The PoA uses "Tool to calculate emission factor of an electricity system" (Version 02.2.1) to calculate the grid emission factor in thte Philippines.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

>>

AMS-I.D ver. 17 applies to grid-connected renewable energy generation projects, including hydropower generation. The following table shows how the PoA meets the eligibility criteria specified in AMS-I.D ver. 17.

Criteria	Explanation
This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	Only project units that are grid-connected hydropower plants will be eligible under each CPA. Therefore the CPAs will meet the criteria under AMS-I.D.
This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement[5] of (an) existing plant(s).	Each project unit under each CPA will be either: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement[5] of (an) existing plant(s). Thus the criteria are met.
If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	All the project units under each CPA will have power capacity below 15 MW for the renewable component of the project and if the unit co-fires any type of fossil fuel the capacity of the entire unit will be under 15 MW. The criteria are met.
Combined heat and power (co-generation) systems are not eligible under this category.	Combined heat and power projects are not part of any CPAs under this PoA. The criteria are met.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	In case of project units involving capacity addition to an existing unit, the power capacity of the additional unit will be lower than 15 MW and will be physically distinct from the existing units. Thus the criteria are met.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	In case any of the project units under each CPA involve retrofit or replacement, the power capacity of the whole unit will be below 15 MW. The criteria is met.
The project units shall not exceed the eligibility	Only project units that are below 15 MW will be

limit of 15MW for a small-scale CDM project activity.	eligible as CPAs. In addition, the size of each CPA will not exceed the threshold of 15 MW. Thus the criteria are met.
Hydro power plants with reservoirs[6] that satisfy at least one of the following conditions are eligible to apply this methodology: - The project activity is implemented in an existing reservoir with no change in the volume of reservoir; - The project activity is implemented in an existing reservoir,[7] where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2; - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	In relation to hydropower plants with reservoir, only project activities resulting in reservoirs with a power density of more than 4 W/m^2 will be eligible under each CPAs. For those with power density between 4 and 10 W/m^2, project emissions will be calculated as per the methodology. The criteria are met.
In the specific case of biomass project activities the applicability of the methodology is limited to either project activities that use biomass residues only or biomass from dedicated plantations complying with the applicability conditions of AM0042.	No biomass project is involved in this PoA. Thus the criteria do not apply.
In the specific case of biomass project activities the determination of leakage shall be done following the general guidance for leakage in small-scale biomass project activities (attachment C of Appendix B of simplified modalities and procedures for small-scale clean development mechanism project activities; decision 4/CMP.1) or following the procedures included in the leakage section of AM0042.	No biomass project is involved in this PoA. Thus the criteria do not apply.
In case the project activity involves the replacement of equipment, and the leakage from the use of the replaced equipment in another activity is neglected because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.	In case of equipment replacement, the replaced equipment will not be able to generate any emissions if used in other facilities anyway as they do not consist of parts that can involve the use of fossil fuels and/or non-renewable biomass. Thus this criterion is not applicable to this type of PoA.

E.3. Description of the sources and gases included in the SSC-CPA boundary

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The project boundary follows the definition of the methodology AMS-I.D and the project power plant and all power plants connected physically to the same electricity system.

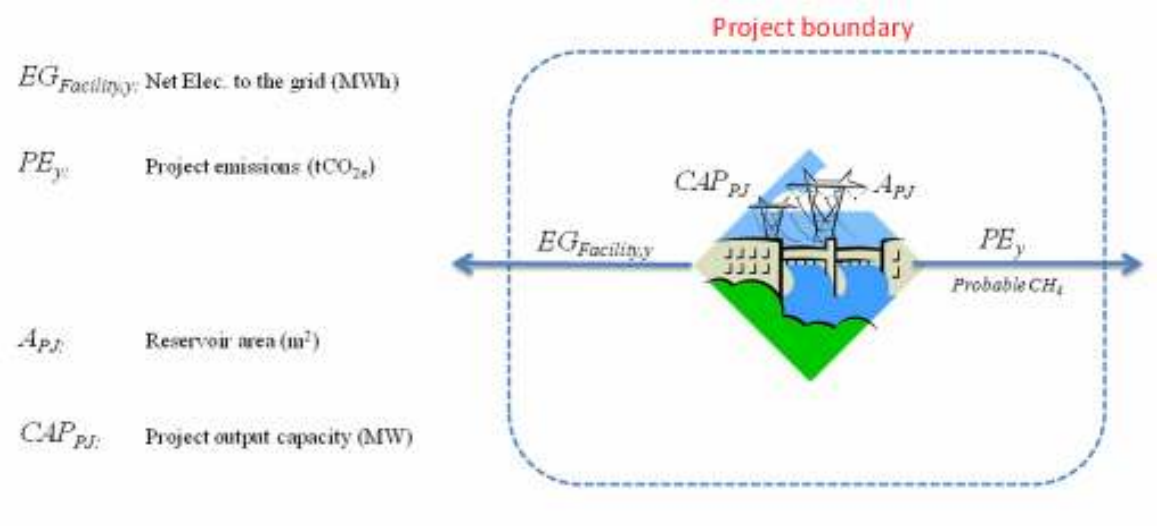

Figure 3. A scheme of the Project boundary

Sources and Gases in the CPA Boundary

Scenario	*Source*	*Gas*	*Incl.?*	*Explanation*
Baseline	Grid	CO_2	Yes	Main emission source
		CH_4	No	Conservative
		N_2O	No	Conservative
Project	Hydro	CO_2	No	Hydropower does not generate CO2 emissions
		CH_4	Yes	Possible methane emissions from the reservoir calculated according to ACM0002
		N_2O	No	Hydropower does not generate N2O emissions

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>>

The baseline scenario is the continued electricity generation from power plants connected to the power grids including the combined margin (CM) emission factor of the corresponding grid ($EF_{grid,CM,y}$). The current energy mix mainly comprises of coal, natural gas, geothermal, hydropower and oil. Energy statistics show that the share of generated electricity from coal in the energy mix has been relatively constant between 2002 and 2010, while the share of natural gas increased significantly. The shares of geothermal and hydropower dropped by nine and three percentage points respectively.[15] Accordingly, the prevalence of fossil fuels in the energy mix is likely to remain the same.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

>>

Additionality is demonstrated on CPA-level. Each CPA has to determine additionality depending on its size and characteristics. To this end, the CPAs are classified into micro- and mini-scale projects. While the micro-scale CPAs are considered additional per se, mini-scale CPAs have to conduct an individual additionality assessment.

A: Micro-scale (≤5 MW):

The EB has issued guidelines for demonstrating additionality of microscale projects of up to 5MW.[16] According to this guidance, renewable energy projects of up to 5MW are additional if any one of the conditions below is satisfied:

a) The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone (SUZ) of the host country identified by the government before28 May 2010;

   i. SUZ is a region in the host country (zone, municipality or any other designated official administrative unit) identified by the Government in official notifications for development assistance including for planning, management, and investment satisfying any one of the following conditions using most recent available data:
      - The proportion of population with income less than USD 2 per day purchasing power parity (PPP) in the region is greater than 50%;
      - The GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures;

   ii. In cases where, based on the recommendation of the designated national authority of the host country, the SUZ in the host country has been approved by Executive Board of the clean development mechanism (CDM), the list of such SUZ shall be maintained on the UNFCCC website. In the case of these SUZ listed on the CDM website there is no need for the project proponents to provide proofs as indicated in paragraph (a) above.

b) The project activity is an off-grid activity supplying energy to households/communities (less than 12 hours grid availability per 24 hrs is also considered .off-grid. for this assessment);

c) The project activity is designed for distributed energy generation (not connected to a national or regional grid) with both conditions (i) and (ii) satisfied;
   i. Each of the independent subsystems/measures in the project activity is smaller than or equal to 1500kW electrical installed capacity;
   ii. End users of the subsystems or measures are households/communities/small and medium enterprises (SMEs).

[16] Guidelines for Demonstrating Additionality of Microscale Project Activities, Version 04.0, EB 68, Annex 26

d) The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country. The following conditions shall apply for DNA recommendations:

iii. Specific renewable energy technologies/measures. refers to grid connected renewable energy technologies of installed capacity equal to or smaller than 5 MW;

iv. The ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent;

v. Most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate compliance with the 3 per cent threshold. In no case shall data older than three years from the date of submission be used;

vi. Technologies/measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible project activities applying the guidelines remains valid for the entire crediting period;

vii. DNA submissions shall include the specific grid connected renewable electricity generation technologies that are being recommended and provide the required data as indicated above (e.g. wind power, biomass power, geothermal power, hydropower).

In order to use option ***A: Micro-scale (≤5 MW***) as the additionality evidence, the CPA may choose option d from the above guidelines if they can demonstrate that:

a) the project activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, and
b) the total installed capacity of the technology/measure contributes less than or equal to 3% of the national grid-connected electricity generation capacity.

If corresponding confirmation from the DNA together with an evidence of 3% share of the technology/measure is achieved, CPAs with a total installed capacity of below and equal to 5MW shall be deemed additional per se and do not have to conduct an additionality assessment.

B: Mini-scale (>5 MW):

CPAs of more than 5MW installed capacity are not eligible under the micro-scale additionality guideline, thus have to conduct an additionality assessment. Project proponents are required to refer to the "Guidelines on the Demonstration of Additionality of Small-Scale Project Activities, Version 09.0, EB 68, Annex 27" that requests project participants to provide an explanation to show that the project activity would not have occurred anyway due to the existence of prohibitive barriers.[17] For the demonstration of additionality the Annex 34 of EB 35 "*Non-binding best practice examples to demonstrate additionality for SSC project activities*" may be used, with focus on varieties of barriers. Therefore each CPA shall elaborate on at least one barrier that prevents project implementation without CDM.

B1. Investment barrier

The investment barrier is applied on CPA level to indicate that the proposed project activity is not financially feasible without the revenue from the CDM. An assessment of the financial indicators of the project activity against a suitable benchmark is to be performed.

[17] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

The most appropriate financial indicator applicable to small hydro power projects is the internal rate of return (IRR) as the activity generates financial benefits through electricity sales. This benchmark represents the minimum IRR that is required for the project to be financially viable and attractive.

In scenarios where equity funding forms part of the financial structure, the equity IRR is to be applied to reflect the attractiveness of the investment to equity investors. In cases where the viability of the project to service debt is to be assessed, the project IRR is to be chosen.

As outlined in the "Tool for the Demonstration and Assessment of Additionality" (Version 05.2), the applicable benchmark will be derived from:

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;

(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;

(c) A company internal benchmark (weighted average capital cost of the company). The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark;

(d) Government/official approved benchmark where such benchmarks are used for investment decisions;

(e) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified.

Benchmark calculation
In accordance with the "Guidelines on the Assessment of Investment Analysis" (Version 5), the selected benchmark will be appropriate to the type of IRR calculated. For calculating the project IRR, local commercial lending rates or the weighted average cost of capital (WACC) can be used as a benchmark. For calculating the equity IRR, official required/expected returns on equity can serve as a benchmark. Alternatively, the Capital Asset Pricing Model (CAPM) can be applied to derive the equity IRR.

Guidelines on applying the WACC
The weighted average cost of capital (WACC) is used to define the minimum standard internal rate of return that an enterprise needs to earn to satisfy affiliated capital providers. The WACC is based on the relative weights of each component of the capital structure of the enterprise assuming the required returns of each of the financiers. All capital sources (including common stock, preferred stock, bonds and any other long-term debt) are to be included in the WACC calculation.

The WACC is calculated as follows:

$$WACC = \frac{E}{V} * R_e + \frac{D}{V} * R_d * (1 - T_c)$$

Where:

E/V = Percentage of financing that is equity, which is calculated by dividing the market value of the equity by the enterprises' total financing.

R_e = cost of equity, which can be determined through investor's stated expected Returns or calculated through the CAPM model (described below).

D/V = Percentage of financing that is debt, which is calculated by dividing the market value of the debt by the enterprises' total financing.

R_d = Cost of debt, which can be determined as the current market rate the enterprise is paying on its debt.

T_c = Corporate tax rate is the effective tax rate that is applicable to the enterprise.

Guidelines on applying the CAPM

The most widely used approach to determine the required return on equity (or cost of equity) of an investment is the Capital Asset Pricing Model (CAPM). The CAPM determines the required return on equity by accounting for (a) the time value of money and (b) risk.

The time value of money is accounted for through the risk-free rate (R_f). This compensates equity investors for placing money in any investment over a defined period of time in a risk-free asset (typically a long-term government bond). The second part of the formula accounts for the risk and derives the amount of compensation the equity investor expects to earn for taking on the additional risk associated with the project activity. This additional risk is determined through the beta ($ß_a$), which compares the returns of the asset to the market over a period of time and to the market premium ($R_m - R_f$).

The CAPM is calculated as follows:

$$R_a = R_f + ß_a (R_m - R_f)$$

Where:

R_a = Risk free rate, which is the return of a riskless investment with an investment horizon comparable to the analysed investment. This is typically an applicable long term government bond yield.

$ß_a$ = Beta of the asset, which defines the relative exposure of the investment to market risk and describes the relationship between the movements of an individual stock versus the market itself. In cases where the enterprise is not publicly listed, the historical volatility of related publicly listed businesses or sectors can be analysed to determine the beta.

R_m = Expected market return. This is calculated as the difference between the return of the market portfolio and the risk-free rate. To account for the country-specific country risk, the country risk-premium of the Philippines is to be included in the expected market return. This can be done through analyzing the premium that reflects the extra risk of the Philippine market over a mature market.

IRR calculation

The input data used in the IRR calculation of the project activity needs to refer to the point the investment decision was made. However, if more recent data is available from purchase orders, financing agreements or PPAs this data can be applied as well. The list of required parameters is outlined inTable 2:

Table 2. Input data used in the IRR calculation of the project activity

Parameter	Unit
Total investment	*PHP*
Loan	*PHP*
Annual electricity generation	*kWh*
Tariff rate	*PHP/kWh*
Annual increase in tariff	*%*
Annual O&M costs	*PHP*
Loan interest rate	*%*
Loan term	*Years*
Debt-to-equity ratio	*Ratio*
Privilege tax rate	*%*
Local tax rate	*%*
Service lifetime	*Years*
Inflation rate	*%*

The parameters listed in table 1 need to be supported by valid evidence available for validation purposes.

The IRR calculation will depend on whether the equity IRR or project IRR is applied, as clarified in the "Guidelines on the Assessment of Investment Analysis". The project IRR calculates serves to determine the viability of the project to service debt, implying that the cost of financing is not accounted for. Equity IRR, on the other hand, determines the return to equity investors and therefore considers the cash outflows associated with debt service payments, but does not account for the loan as an initial investment cost.

The calculated IRR without and with CDM revenues will be presented in the following table:

Table 2: Comparison of the equity IRR with the benchmark rate of return

	IRR without CDM	IRR with CDM	Benchmark
Project activity	[ ] %	[ ] %	[ ] %

Sensitivity analysis

The robustness of the investment analysis is to be been tested by subjecting key parameters to reasonable variations. The "Guidelines on the Assessment of Investment Analysis" define key parameters as those which constitute more than 20% of the total project costs or total project revenue and reasonable variation is defined as a range of +10% and - 10%.

Given their material impact on the financials of the project activity, the tariff rate and the total investment cost are to be included in the sensitivity analysis. Any other relevant key parameters are also to be included in the assessment (e.g. electricity generation, O&M costs and Plant Load Factor).

In circumstances where the calculated IRR exceeds the benchmark in one or more scenarios considered under the sensitivity analysis, an assessment of the probability of the occurrence of these scenarios in comparison to the likelihood of the assumptions in the presented investment analysis is to be provided.

The outcome of the sensitivity analysis will be presented in the following table:

Table 3: **Outcome of the sensitivity analysis**

Parameter	Change	IRR	Probability
Tariff rate	+10%	[number]%	[explanation if higher than the benchmark]
	-10%	[number]%	[explanation if higher than the benchmark]
Investment cost	+10%	[number]%	[explanation if higher than the benchmark]
	-10%	[number]%	[explanation if higher than the benchmark]
(if applicable)	+10%	[number]%	[explanation if higher than the benchmark]
	-10%	[number]%	[explanation if higher than the benchmark]
(if applicable)	+10%	[number]%	[explanation if higher than the benchmark]
	-10%	[number]%	[explanation if higher than the benchmark]

B2. Access to finance barrier

The main barrier to the investment in hydropower plants is the access to loans. With high investment costs per MW installed, hydropower plants usually apply for large amounts of external finance.

Hydropower projects require loan conditions that differ from other investment projects:

- Hydropower plants require longer grace periods and payback periods as that the plants only start generating revenues of up to 6 years after the first expenses are due. This is caused by long planning periods (2~3 years) and long construction periods (2~3 years).[18]
- The design of a hydropower plant is based on a thorough assessment of geologic and hydrologic conditions, including yearlong measurement campaigns. Due to this lengthy and costly process, hydropower plants often require loans during the pre-development stage already.

LBP is the main lending institution for this PoA. The bank's lending department considers CDM revenues a crucial factor to increase the creditworthiness of projects applying for loans. The evaluation of the applicants is based on the Bank's Risk Asset Acceptance Criteria (RAAC). In addition, the Bank also adopts an Internal Credit Risk Rating System and uses a Borrower Risk Rating (BRR) Sheet to assess creditworthiness of the borrower. The CDM can form an important pillar in the borrower's capacity to repay the loan. Carbon revenues can shorten the payback period to an acceptable level or the ERPA can serve as collateral.

B3. Technological barrier

Each CPA may add a list of technological barriers that prevent the implementation of the project if excluded from the PoA. In other words, it should be demonstrated that the CPA can tackle these barriers by becoming part of this PoA. Technological barriers can be of direct or indirect origin. Examples can be lack of MHP experts, lack of O&M knowledge, hydrological and climatic risks on sufficient operation of the MHP plants etc.

B4. Other barriers

Other barriers may be identified and elaborated in each CPA if found that without the project activity, for a specific reason identified and explained in the CPA (such as institutional barriers or limited information,

[18] Interview with Department of Energy of the Philippines, 2 August 2011. Long planning periods are also reflected in an overview of 107 projects that started pre-development since 2009, of which only 8 are operational.

managerial resources, organizational capacity, financial resources, prevailing practices or capacity to absorb new technologies) emissions would have been higher.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

>>

In a first step, the project proponents have to determine whether the project falls under the microscale additionality or has to conduct an additionality assessment.

A: Micro-scale:

Criterion for applicability of microscale guidance	Source
Power capacity of each CPA is below or equal to 5MW.	Feasibility study, nameplates of installed equipment

If the above criterion is met and the conditions are satisfied in accordance with the micro-scale additionality guidance as elaborated in E.5.1, the CPA is deemed additional and no further assessment is required.

If the micro-scale criterion is not met, the CPA has to conduct an additionality assessment on the basis of the following criteria:

B: Mini-scale:

B1: Investment barrier:

If the CPA applies an investment analysis, the following data has to be provided:

- Project or equity IRR to be assessed: each CPA has to determine the financial indicator that will be assessed.
- Benchmark: the selected financial indicator is compared to an appropriate benchmark. The benchmark is selected following relevant guidance of the EB.
- Financial parameters of the project: a financial analysis is conducted for each project unit covered under the CPA, determining the value for the selected financial indicator.
- If the project financials are below the benchmark, the project is additional.

B2. Access to finance barrier

- Use of CDM to overcome barrier: in order to demonstrate that the CDM allowed the project to gain access to finance, the project proponents shall provide proof that the CDM application was a crucial factor in granting a loan. Documentation to support this is provided by the respective lending institution.
- Unavailability of alternate finance: to support the claim of the access-to-finance barrier, project participants can present rejection letters from other banks. This, however, is not mandatory.

B3. Technological barriers

- Prevalence of technological barriers: the project proponents should provide proof of technological barriers. This argument can be supported with official reports and documents issued by government authorities, universities and research institutes.

B4. Other barriers

- The argumentation and data presented under other applicable and credible barriers shall be backed by plausible and reliable evidence and sources.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

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Per AMS-I.D, ver. 17, para. 23, emissions reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

where:

ER_y	emissions reductions in year y; in tCO_2e/yr
BE_y	baseline emissions in year y; in tCO_2e/yr
PE_y	project emissions in year y; in tCO_2e/yr
LE_y	leakage emissions in year y; in tCO_2e/yr

There is no publication by the DNA of the Philippines regarding valid grid EF of the electricity networks in the Philippines. In order to calculate EF_{CO2}, the *"Tool to calculate the emission factor for an electricity system" (version 02.2.1)* is applied. The grid emission factor is calculated for each CPA on the basis of the most recent data available at the time of CPA inclusion. This ex-ante determined emission factor does not change over the crediting period of the CPA.

The analysis covers the following steps:

STEP 1. Identify the relevant electricity systems.
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3. Select a method to determine the operating margin (OM).
STEP 4. Calculate the operating margin emission factor according to the selected method.
STEP 5. Calculate the build margin (BM) emission factor.
STEP 6. Calculate the combined margin (CM) emissions factor.

Step 1. Identify the relevant electricity systems

As the whole country is covered under the PoA, all power grids are included. There are two grids within the Philippines, namely the Luzon-Visayas and Mindanao grid. The spatial coverage is shown in figure 1.

In addition, there are small island grids that are not connected to any of the national grids. The calculation of the emission factor of the island grids does not form part of this calculation. Should a CPA that is connected to an island grid be included in the PoA, an emission factors are calculated separately following the guidance of the Tool to calculate the emission factor for an electricity system.

Figure 4 Spatial coverage of the Philippine national grids

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

The calculation will not include off-grid power plants.

Step 3. Select a method to determine the operating margin (OM)

The operating margin (OM) may be determined using one of the following calculation methods:

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

For the calculation of the operating margin emission factor, the simple OM method and the average OM method are chosen. The **simple OM method** is applicable to the Luzon and Visayas grid as low-cost/must-run resources, such as hydro, geothermal, solar, wind and biomass, constitute less than 50% of total grid generation. For the Mindanao grid, the **average OM** is applied as low-cost/must-run sources exceed 50%.[19]

The calculation will be based on a weighted average using data sets from the most recent 3 years (ex-ante option). This ex-ante determination of the baseline does not require recalculation during the crediting period. Accordingly, data for the years 2008-2010 is used.[19]

Step 4. Calculate the Operating Margin (OM) emission factor according to the selected method

(a) Simple OM

As there is data on the electricity generation and the CO_2 emission factor of each power unit, the calculation is based on the net electricity generation and a CO_2 emission factor of each power unit (Option A). The simple OM emission factor ($EF_{grid,OMsimple,y}$) of each grid is calculated as the generation-

[19] The baseline and ER calculation spread sheet, the data is from the Department of Energy of the Philippines

weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the respective system, not including low-cost / must-run power plants / units.

Electricity imports are considered to be zero.

(d) Average OM

The average OM emission factor ($EF_{grid,OM\text{-}ave,y}$) is calculated as the average emission rate of all power plants serving the grid. The same method as for the calculation of the simple OM is used, but including in all equations also low-cost/must-run power plants. Similarly, the total net electricity generation of all power plants serving the system and the CO_2 emission factor of each power unit (Option A) is used.

Step 5. Calculate the Build Margin (BM) emission factor

In terms of vintage of data, for the first crediting period, the build margin emission factor is calculated *ex-ante* based on the most recent information available.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);
b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%,}$ in MWh);
c) From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SETsample);

The build margin emission factor ($EF_{grid,BM,y}$) is calculated on the basis of the most recent plants added to the grid (sample group). According to the Tool, the proponents may choose from the five most recently commissioned plants, or 20% of the grid capacity counting those plants most recently added in reverse order of the date of their coming into operation, whichever is greater in terms of capacity.

An overview of the plants included in the build margin can be found in Annex 3.

The build margin emission factor is calculated ex-ante (Option I) on the basis of the most recent information available on units already built for sample group at the time of CPA-DD submission to the DOE for inclusion. The ex ante option is chosen; hence the result of the calculation will apply throughout the crediting period, and need not be monitored and recalculated annually.

The build margin emission factor is the generated-weighted average emission factor (tCO_2/MWh) of power units in sample group *m* during the most recent year *y* for which power generation data is available. BM is calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y}.EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which electricity generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step4(a) of the simple OM, using options A1 or A2 or A3, using for y the most recent historical year for which power generation data is available, and using m the power units included in the build margin.

Step 6. Calculate the combined margin (CM) emissions factor

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

a) Weighted average CM; or
b) Simplified CM

The weighted average CM method (option a) should be used as the preferred option.
The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered CDM projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

The method used for this PoA is option a, Weighted average CM. The combined margin emissions factor is calculated as follows:

$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

For hydropower projects, $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period , and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

The combined-margin calculation is an ex-ante calculation that does not have to be recalculated during the crediting period.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

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Per AMS-I.D, ver. 17, para. 23, emissions reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (2)$$

where:

ER_y emissions reductions in year y; in tCO_2e/yr

BE_y baseline emissions in year y; in tCO_2e/yr

PE_y project emissions in year y; in tCO_2e/yr

LE_y leakage emissions in year y; in tCO_2e/yr

Baseline emissions, BE_y , are determined by as generation times an emissions factor. The amount of electricity generated is determined on the basis of *ex post* metering.

Project Emission (PE_y)

Project emissions from water reservoirs of hydro power plants have to be considered following the procedure described in the ACM0002 ver.12.1.0.

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs and if the power density of the project activity is greater than $4W/m^2$ and less than or equal to $10W/m^2$, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows,:

$$PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000}$$

Where:

$PE_{,HP,y}$ = Project emissions from water reservoirs (tCO2e/yr)

EFR_{es} = Default emission factor for emissions from reservoirs of hydro power plants in year y (kgCO2e/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)

CH4 emissions are considered to be zero when power density is higher than 10W/m2.

Leakage is to be considered if energy generating equipment is transferred from another activity. This is not the case for this PoA, leakage is thus considered to be zero.

$LE_y = 0.$

Baseline Emissions (BE_y)

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor, given by the following formula:

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where:

BEy Baseline Emissions in year y ($t\ CO_2$)

$EG_{BL,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO2,grid,y}$ CO_2 emission factor of the grid in year *y* (t CO_2/MWh)

Emission factor of the grid (GEF_y)
The emission factor will be calculated *ex-ante* for each CPA and applied for the whole crediting period. It will be calculated as the 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".

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

The general data that must be supplied by each CPA and project units at application for entry into the PoA are summarized in the table below:

Table 4 Basic Data on CPA

No.	*Item*	*Unit*	*Rationale*
1.	CPA Name		To identify CPA
2.	Owner's Name		To identify CPA
3.	Grid to which connected		Determines value for EF
4.	Location -- Province, City		To prove location eligibility
5.	Location coordinates	Lat., Long.	To avoid double-counting risk
6.	Capacity	MW	To prove size eligibility
7.	Start of "real action"	mm/dd/yy	To prove eligibility under PoA
8.	Start date of operation or CPA crediting period, whatever is earlier	mm/dd/yy	To estimate CERs
9.	Plant Load Factor	% or hours/year	To estimate CERs
10.	Annual elec. generation projected	MWh	To estimate CERs

Data / Parameter:	**$EG_{BL,y}$**
Data unit:	MWh
Description:	Electricity generated and delivered to grid in year ***y***
Source of data used:	Metered electricity production on plant level and feed-in data of grid company
Value applied:	Determined on project level.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity fed into the grid forms the basis for the calculation of emission reductions. Two sets of data are available, both with the operator of the power plant and the grid company. Electricity feed in is measured continuously.
Any comment:	

Data / Parameter:	Project emissions ($PE_{HP,y}$)
Data unit:	tCO_2
Description:	CO_2 emissions of the project activity in year y
Source of data used:	Calculated according to ACM0002 *Consolidated baseline methodology for grid-connected electricity generation from renewable sources*
Value applied:	Determined on project basis
Justification of the choice of data or description of measurement methods and procedures actually applied :	CH_4 emissions from the reservoir are calculated applying the following formulas: $PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000}$ Where: $PE_{HP,y}$ = Project emissions from water reservoirs (tCO2e/yr) EFRes = Default emission factor for emissions from reservoirs of hydro power plants in year *y* (kgCO2e/MWh) TEGy = 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) CH_4 emissions are considered to be zero when power density is higher than $10W/m^2$. The power density is calculated as follows: $PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$ Where: *PD* = Power density of the project activity (W/m2) *CapPJ* = Installed capacity of the hydro power plant after the implementation of the project activity (W) *CapBL* = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero *APJ* = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2) *ABL* = Area of the reservoir 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
Any comment:	

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO2 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"
Source of data used:	Calculated ex-ante based on the data supplied by Department of Energy of the Philippines as per the "Tool to calculate the emission factor for an electricity system". If a national grid emission factor published by the DNA of the Philippines is available, this data will be used.
Value applied:	Calculation on the basis of the latest available data at the time of CPA inclusion.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The baseline emission factor is needed to estimate the amount of a CPA's emission reductions. CM emission factor was calculated using OM and BM emission factors as per the "Tool to calculate the emission factor for an electricity system".
Any comment:	Details of calculations are available in spreadsheets.

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build margin (BM) emission factor.
Source of data used:	Calculated ex-ante based on the data supplied by Department of Energy of the Philippines as per the "Tool to calculate the emission factor for an electricity system". If a national grid emission factor published by the DNA of the Philippines is available, this data will be used.
Value applied:	Calculation on the basis of the latest available data at the time of CPA inclusion.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The BM emission factor together with OM emission factor is needed to calculate the combined margin emission factor which is used to estimate the amount of the CPA's emission reductions.
Any comment:	Details of calculations are available in spreadsheets.

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor
Source of data used:	Calculated ex-ante based on the data supplied by Department of Energy of the Philippines as per the "Tool to calculate the emission factor for an electricity system". If a national grid emission factor published by the DNA of the Philippines is available, this data will be used.
Value applied:	Calculation on the basis of the latest available data at the time of CPA inclusion.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The OM emission factor is needed together with BM emission factor to calculate the combined margin emission factor which is used to estimate the amount of the CPA's emission reductions.
Any comment:	Details of calculations are available in spreadsheets.

Data / Parameter:	$EF_{grid,island}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor of island grids not connected to the national grids
Source of data used:	Calculated separately for each CPA not connected to the national grid as per the "Tool to calculate the emission factor for an electricity system".
Value applied:	To be elaborated in each CPA separately.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The baseline emission factor is needed to estimate the amount of a CPA's emission reductions. CM emission factor will be calculated using OM and BM emission factors as per the "Tool to calculate the emission factor for an electricity system".
Any comment:	

Data / Parameter:	EF_{Res}
Data unit:	kgCO2e/MWh
Description:	Default emission factor for emissions from reservoirs
Source of data used:	Decision by EB23
Value applied:	90 kgCO2e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Applicable according to ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".
Any comment:	

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data:	Project site
Value applied	To be elaborated in each CPA separately.
Justification of the choice of data or description of measurement methods and procedures actually applied :	To be elaborated in each CPA separately.
Any comment:	-

Data / Parameter:	CAP_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity

Source of data:	Technical specification of the equipment as defined in Feasibility Study Report
Value applied	To be elaborated in each CPA separately.
Justification of the choice of data or description of measurement methods and procedures actually applied :	To be elaborated in each CPA separately.
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**$EG_{BL,y}$**
Data unit:	MWh
Description:	Net electricity delivered to grid in year ***y***
Source of data to be used:	Metered
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not Applicable (there is no section B.5 in PoA-DD templates)
Description of measurement methods and procedures to be applied:	The net amount of delivered electricity to the grid will be monitored continuously through a bidirectional meter. If not bidirectional, an additional meter has to be installed to measure the internal use of electricity as well. The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export ($EG_{export,y}$) and the import ($EG_{import,y}$). Metered electricity forms the basis for monthly billing to the grid company. Consequently, the meters only record electricity delivered to the grid. The metered data will be recorded hourly and invoices to the grid company will be issued monthly. Where the employed technology allows, metering results will automatically be fed into a remote monitoring system. Where this is not possible, data will be recorded manually.
QA/QC procedures to be applied:	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. There will be a built-in cross-check since the grid company will independently measure electricity delivered by the power plant.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

These parameters are for when unidirectional meters (instead of bidirectional meters) are used to meter the exported and imported electricity:

Data / Parameter:	**$EG_{export,y}$**
Data unit:	MWh
Description:	Total amount of electricity exported to grid in year ***y***
Source of data to be used:	Metered
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not Applicable (there is no section B.5 in PoA-DD templates)
Description of measurement methods and procedures to be applied:	The total amount of delivered electricity to the grid or the gross energy generation will be monitored continuously through a unidirectional meter. The metered data will be recorded hourly. Where the employed technology allows, metering results will automatically be fed into a remote monitoring system. Where this is not possible, data will be recorded manually.
QA/QC procedures to be applied:	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

Data / Parameter:	**$EG_{import,y}$**
Data unit:	MWh
Description:	Total amount of electricity imported from grid in year ***y***
Source of data to be used:	Metered
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not Applicable (there is no section B.5 in PoA-DD templates)
Description of measurement methods and procedures to be applied:	The total amount of electricity imported from the grid to the project power plant will be monitored continuously through a unidirectional meter. The metered data will be recorded hourly. Where the employed technology allows, metering results will automatically be fed into a remote monitoring system. Where this is not possible, data will be recorded manually.
QA/QC procedures to be applied:	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC

	standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	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"
Source of data to be used:	Calculated ex-ante. No need to be monitored/update continuously but updated in the beginning of each crediting period according to the "Tool to calculate the emission factor for an electricity system".
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not Applicable (there is no section B.5 in PoA-DD templates)
Description of measurement methods and procedures to be applied:	CM emission factor will be calculated using OM and BM emission factors as per the "Tool to calculate the emission factor for an electricity system". Monitored once at the beginning of every crediting period. No need to be monitored/updated continuously.
QA/QC procedures to be applied:	The CM emission factor will be calculated using the most recent officially certified data available on national power grids.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

Data / Parameter:	**TEG_y**
Data unit:	MWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y*
Source of data to be used:	Metered electricity production on plant level
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A (there is no section B.5 in PoA-DD templates)
Description of measurement methods and procedures to be applied:	Metered electricity on the project site. The parameter will be monitored continuously. The metered data will be recorded hourly. Where the employed technology allows, metering results will automatically be fed into a remote monitoring system. Where this is not possible, data will be recorded manually.
QA/QC procedures to	Measuring equipment should be certified to national or IEC standards and

be applied:	calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

Data / Parameter:	**A_{PJ}**
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each CPA.
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures, etc Monitored annually.
QA/QC procedures to be applied:	To be specified in each CPA.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

Data / Parameter:	**CAP_{PJ}**
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each CPA.
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on recognized standards Monitored annually.
QA/QC procedures to be applied:	To be specified in each CPA.
Any comment:	Data collected will be archived electronically and kept for at least two years after the crediting period.

E.7.2. Description of the monitoring plan for a SSC-CPA:

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The MHP plant operator shall assign at least one monitoring technician responsible for data collection and recording and one monitoring officer to check the consistency and approval of the data daily. It is not possible to have one person covering both of the responsibilities. The tasks and responsibility of the monitoring technician and officer are described as the following:

Monitoring technician:

- Daily check on metering equipment and ensuring their continuous performance and reporting any unusual issue in daily reports;
- Measuring and recording the data according to the monitoring manual;
- Preparing daily data collection reports for internal approval by the monitoring officer; The reports shall include any unusual performance of the meters and the monitoring procedure;
- Following necessary calibration due time for metering equipment if necessary as per monitoring officer guidance;

Monitoring officer:

- Responsible for the monitoring operation and procedures performed by the monitoring technician;
- Reviewing the daily monitoring reports prepared by the technician;
- Checking the consistency of the daily metered and recorded data as indicated in PoA and CPA-DD in compliance with the applied methodology and approving the daily monitoring reports;;
- Scheduling necessary calibration plans for the meters;
- Preparing monthly monitoring reports to the MHP plant operator be sent to the managing entity (LBP);

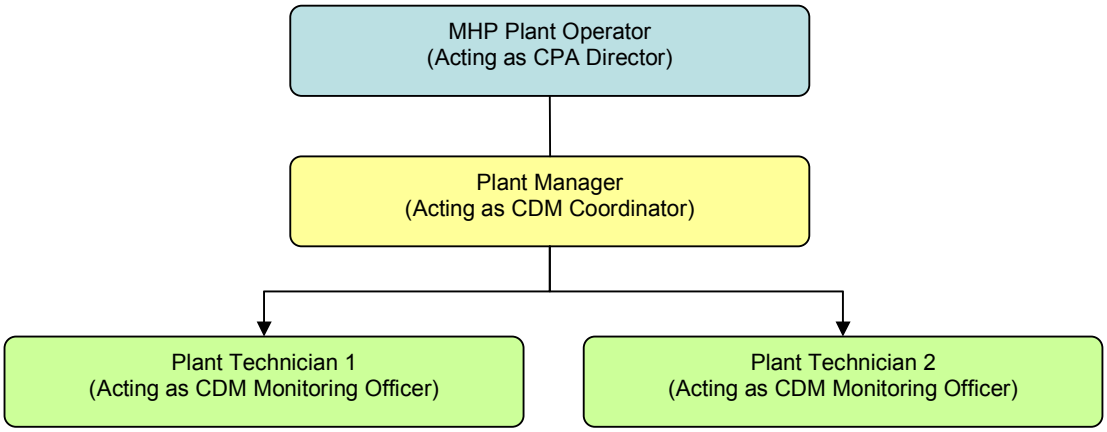

Figure 5. Monitoring structure between the CME and MHPs under each CPA

CPA Operations Plan: Each of the CPA activities will develop an operations plan that defines a standard against which the project performance will be measured in terms of its emission reductions (ER) and conformance with all standards and criteria under the PoA. It assists the project operator in establishing a credible, transparent, and adequate data measurement, collection, recording and management system to coordinate all the monitoring requirements for generating certified emission

reductions from their project and for ensuring compliance of the project proponent with the obligations with LBP under the PoA.

The CPA Operations Plan outlines the following plan:

Responsibility and organization: The Operator of the power plant will be in charge of metering the monitoring parameters in section E.7.1. The designation of a dedicated, trained monitoring officer at each hydropower plant will ensure that metering is implemented according to the monitoring plan.

The Operator shall carry out the monitoring in accordance with LBP's monitoring manual which will encompass among other areas provisions, monitoring, data management, and reporting which will specifically establish:

- a set of procedures that cover all key processes in the business;
- monitoring processes to ensure they are effective;
- keeping adequate records;
- checking output for defects, with appropriate and corrective action where necessary;
- regularly reviewing individual processes and the quality system itself for effectiveness; and
- facilitating continual improvement

The Operator must comply fully with the all CDM requirements in the methodology and the PoA/CPA-Design Documents for operation and for monitoring and reporting electrical production and consumption.

Monitoring: To be monitored are those parameters described in Section E.7.1 which also details the means of measurement and Quality Assurance and Quality Control (QA/QC) procedures.

Electricity fed into the grid will be metered continuously. While a meter for the measurement of the amount of electricity fed into the grid is installed in every grid-connected power plant, a meter to determine gross power production would need to be installed.

Metering results on plant-level for electricity fed into the grid will be cross-checked with receipts on electricity feed-in from the grid operator.

The size of the reservoir and the installed capacity are monitored annually. The size of the reservoir is established using maps or topographical surveys. The installed capacity is determined by visiting the facility during the monitoring period and checking the generators and their name plates. Monitoring results are recorded and reported to LBP on an annual basis.

Emissions from the reservoir only need to be monitored if the power density is above 4 W/m^2 and below 10W/m2. If power density is lower than 10W/m2, the operator of the MHP will monitor gross power generation. To this end, another meter metering gross electricity generation will be installed. Gross power generation will be monitored continuously and recorded hourly. The operator of the MHP will submit monitoring results to LBP monthly using a standardised submission form.

Quality Assurance and Quality Control (QA/QC): The proponent will have a quality assurance and quality control plan in order to ensure that monitoring is done accurately and with properly calibrated instruments. The basic requirements are outlined in Section E.7.1.

Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.

Data recording: Proper management processes and systems records will be required by the operator, as the auditors will request copies of such records to judge compliance with the required management systems. All data recording of the monitored data will include both paper and electronic versions, backup systems and periodic checking for data entry mistakes.

This data includes both measurement records as well as external proofs, such as receipts from the grid operator. The data are stored locally and are delivered to LBP for further processing.

All documents including maps, diagrams, engineering and environmental assessments will be kept in a central place, together with this monitoring plan. All information will be stored by the monitoring group and all material will have a copy for backup.

Record keeping will be maintained for a period of not less than 2 years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

Reporting: Monitoring data will be reported monthly to LBP along with any major issues related to the monitoring system that may need attention. The estimation of emission reductions and reporting of the data for verification purposes will be done annually by LBP based on the aggregated data as outlined in Section A.4.4.2.

The specific steps for data collection and reporting are listed below:
- The data of electricity supply to the grid will be recorded continuously electronically.
- The Operator will read, record and keep the measured data from the meters and reports the data to LBP and project owner on a monthly basis.
- The grid company will provide sales documents for cross-checking.
- The Project owner will provide meters' readings and photocopies of feed-in invoices to DOE in the time of emission reductions verification.

Calculation of emissions reductions: Based on the monitoring data the emission reductions will be calculated ex-post using the following approach presented in Section E.6.2.

Emergency plan: The PoA has foreseen an emergency plan for when the monitoring meters are not functioning due to any unexpected circumstances. When any of the main monitoring meters are not able to record the necessary data including the amount of the net exported electricity, the data during those moments will be taken from a second meter that is controlled by the utility company to which the electricity is exported. This meter is only accessible by the utility company thus arrangements will be carried out during unexpected emergency situations.

E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

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Date of completion of the application of the baseline study and monitoring methodology: 19 August 2011.

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Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY AND PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

At the PoA level, there is no public funding of the PoA, and none will be sought.

Annex 3

BASELINE INFORMATION

Please see separate calculation spreadsheet

Annex 4

MONITORING INFORMATION

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