Programme of activities design document form
(Version 09.0)

BASIC INFORMATION	
Title of the PoA	Tunki Small Scale Hydropower Program of Activities[1]
Version number of the PoA-DD	7
Completion date of the PoA-DD	27/11/2019
Coordinating/managing entity	Carbonbay GmbH & Co. KG
Host Parties	Peru
Applied methodologies and standardized baselines	Methodology AMS-I.D. ver 18 [2] – Grid connected renewable electricity generation Standardized Baseline: Not Applicable
Sectoral scopes	01

[1] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/8J56SG0WRNM7LZIUPC3DAYQXKBEFV1/view

[2] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

The Tunki Small Scale Hydropower Program of Activities aims at developing a series of grid connected small hydroelectric projects in Peru.

1. General operating and implementing framework of PoA:

The Tunki PoA supports the development of new small-scale hydropower projects in Peru connected to the Peruvian National Electricity Grid (SEIN). Each small-scale CDM Program Activity (referred to later on as CPA) under this PoA comprises one or more hydropower plan projects having a combined installed capacity of no more than 15 MW in the case of new facilities or a capacity addition, replacement or retrofit of no more than 15 MW for the total plant capacity in the case of existing facilities, considering the threshold for small-scale CDM projects. This PoA is a voluntary action being coordinated and managed by Carbonbay GmbH & Co. KG. (Referred later on as Carbonbay or the coordinating/managing entity - CME). Carbonbay works closely with the developers of the hydropower plants (CPA owners) and other organizations active in the hydropower sector in the host country to facilitate the development of new power plants and their inclusion in this PoA.

2. Policy/measure or stated goal of the PoA

The objective of this PoA is to develop a platform for overcoming institutional, financial and structural hurdles for the construction of a series of small hydroelectric power plants projects or increase the generation capacity of exiting power plants. All projects are small scale new grid connected hydropower facilities which allows the National Electric Power Grid (SEIN, Sistema Interconectado Nacional) to maintain in stand-by or delay the development of new thermal power plants, thus displacing expensive generation fuelled by heavy fuel oil, diesel, coal or natural gas, while reducing GHG emissions and increasing the amount of energy available on the grid. Then, the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

Economic sustainability:

- The PoA increases employment opportunities in the area where the CPAs are located, which increases local communities' income.
- The PoA provides secure access to carbon revenues for small CPA owners that have no possibilities to overcome the CDM registration costs and help to achieve the financial closure.
- The PoA reduces the time and uncertainties to achieve additional finance trough carbon revenues on future CPAs, making the proposed activity more attractive to others source of capital or equity
- The PoA creates new sources of renewable energy in a sustainable way, sparking the sustainable development of the area influenced by each CPA, with local investment and business environment, and thereby improving the local economy.
- The PoA contributes to Peru's fiscal accounts through the payment of taxes from the new hydropower facilities related to their power generation activities.
- The PoA helps the country improve its hydrocarbon trade balance through a reduction of oil imports to be used for electricity generation.
- The PoA diversifies the sources of electricity generation, important for meeting

growing energy demands and the transition away from natural gas, diesel and coal-supplied electricity generation.

- By only allowing small hydro, the PoA helps market players with limited capital resources to develop their renewable energy projects which otherwise wouldn't have been implemented due to the low profitability of such projects. CERs sales generated by first CPAs is also a potential capital source for future participants of the PoA at early initial stages.

Social sustainability:

- The PoA supports the development of hydropower resources in many cases located in remote parts of the host country, where may not be supplied electricity from the national grid in absence of the PoA, thereby providing access to power for populations that are socially disadvantaged and promoting its connection to the national grid.
- During civil works, the CPA is expected to generate considerable employment opportunities for the local population.
- Moreover, the PoA generates demand for various kinds of related services, which would generate employment on regular and permanent basis.
- The newer and reliable energy source creates better conditions for the promotion and the development of sustainable commercial activities on depressed areas.

Technology sustainability:

- The PoA supports technology and know-how transfer from other regions or even other countries through trainings and practical works and facilitates the implementation of environmentally safe technologies to the country.
- The PoA generates demand for local products when spare parts are needed.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

The PoA is a voluntary action being coordinated and managed by Carbonbay GmbH & Co. KG. There are no mandatory laws or regulations in place in the host countries that require hydropower plants to seek CDM services. Likewise, no mandatory laws or regulations exist requiring the coordinating/managing entity or any other party to develop a PoA for hydropower plants in the host country.

A.2. Physical/geographical boundary of PoA

The PoA is developed throughout the departments of Peru.

A.3. Technologies/measures

All CPAs under the PoA is small run-off-river hydro power plants with an installed capacity below or equal to 15 MW or hydro power plants with a capacity additions/retrofitting/replacement that not exceed 15 MW for the total final capacity of the facility, connecting to the Peruvian national electricity grid. Though, detailed technical characteristics differ, the following general conditions apply for all CPAs:

- The projects can be run-of-the-river with no more than a control reservoir, if any.
- Projects can result in new reservoirs or an increment in an existing one if the methodology conditions are fulfilled.
- Water is diverted to the power plant through the most environmentally friendly alternative viable while ensuring a minimum ecological flow according to national regulations.
- The water is conducted through a penstock to the powerhouse.

- One or more turbines and suitable generator(s) are located in one or more power houses.
- The facility supplies electricity to the electricity grid and, if applicable, to specific consumers.
- A discharge channel returns the water to the natural riverbed or water channel.

The proposed PoA is a Sectoral scope 1 programme (Energy industries, renewable - / non-renewable sources).

A.4. Coordinating/managing entity

Carbonbay GmbH & Co. KG
Mr. Wolfgang Brueckner
Managing Director
Große Theaterstr. 14
20354 Hamburg, Germany
Tel +49 1733412363
Fax +49 +49 3222 196 9974
mailto: wolfgang.brueckner@carbonbay.com
http://www.carbonbay.com

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Peru (host)	Ecoressources Carbono S.A.C	No
Germany	Carbonbay GmbH & Co. KG.	No
Sweden	Swedish Energy Agency	No

A.6. Public funding of PoA

Neither the PoA nor the CPAs participating on it are receiving or receives public funding that constitutes a diversion of official development assistances. The coordinating/managing entity has not received public funding of any type for the purpose of developing and/or implementing this PoA.

SECTION B. Management system

The CME has developed and implemented a management system that includes the following management and arrangement responsibilities related to operations and management:

- Define the roles and responsibilities of personnel involved in the process of inclusion of CPAs. The CME has a procedure of responsibilities and organization.
- Maintain existing relationship with the CPA owners (E.g. assure that proper training for data monitoring is being provided to CPA owners if needed).
- Implement technical review of inclusion of CPAs. The CME sets a framework for the implementation of the PoA and the approval of the CDM program activities (CPAs) to be included under the PoA.
- Implement a procedure to avoid double counting and de-bundling issues based on the establishing formal documentation with the CPA owner (E.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA).
- Establish operational and management arrangements for the implementation of the PoA, including a record keeping system for each CPA under the PoA, that considers:
    - Name of the CPA;
    - Name of the implementing entity of the CPA;

  - Contact detail of the implementing entity, including contact person, address, telephone and e- mail;
  - Installed capacity and other relevant technical specifications of the CPA;
  - Location of the CPA (GPS coordinates of the powerhouse);
  - Verification status and monitoring reports.
- Maintain the recording and storing of all relevant information of the PoA and CPAs in a minimum of two geographically distinct, secure digital locations (e.g. in two different offices, in the cloud system, among others). The information can be made remotely available to the DOE for validation and/or verification. The CME develops and implement a procedure of documentary and data control for the CPA process that leads to records and documentation for each CPA under the PoA.
- Maintain and implement a procedure for continual improvements of the PoA management.
- Maintain procedures for the implementation of corrective and preventive actions and update the grid emission factor calculation.
- Be the focal point for all communication with the UNFCCC related to the PoA. Ensure that those operating the CPA are aware and agree that their activity is being subscribed to the PoA.
- Obtain letters of approval for the implementation of the PoA from the Host Party and the Annex I Party involved in the PoA.
- Submit to the DOE the necessary documents for validation and inclusion of CPAs.
- Forward, after having ensured that all the requirements determined in the PoA and its specific CPA- DD are met, the completed CPA-DD form to any DOE for consistency checking.
- Collect monitoring data of all CPAs.
- Prepare monitoring reports for emission reduction verification processes.
- Maintain all monitoring reports of all CPAs in accordance with the record- keeping system identified in the PoA-DD.
- Make available all monitoring reports requested by a DOE for verification purposes.
- Submit a request for forwarding of CERs issued in accordance with the Submit a request for forwarding of CERs issued in accordance with the
- Obtain or calculate the grid emission factor to be used by the CPA owner during their crediting period.
- The project implementer (CPA Owner) has the following management and arrangement responsibilities:
- Implement the hydropower plant project activity accordingly to the registered CPA-DD, including construction timeline and operation and maintenance standards.
- Compile and record data according to the monitoring plan and provide required information to the coordinating/managing entity in order to prepare monitoring reports according to the registered CPA-DD.

To consolidate all of its duties as CME, Carbonbay has developed a management system for the Tunki PoA. All of the procedures are part of a CME Operation Manual and all the templates and related documents have been developed.

Carbonbay develops as CME of the proposed PoA and has direct contact with all the CPA owners in order to implement all the responsibilities of a CME. This agreement is operative for all the duration of the PoA. To properly implement the PoA, each CPA owner enters into a contractual arrangement with Carbonbay where the inclusion conditions are described, including the requirement to work directly with the CME, submitting all requested information of the project and giving support and assistance during the implementation and operation phases, in order to meet the inclusion and monitoring requirements of the PoA. Then the proper operation of the PoA is supported by formal agreements and all CPAS are included in the PoA, only after a formal recognition that they are aware of and have agreed to the rights and responsibilities that this participation entails has been signed.

Monitoring Plan:

Monitoring is carried out by each hydro power plant in every CPA. The coordinating/managing entity stores the data in an electronic database. Primary data is stored by the CPA owners.
Verification occurs either separately for each CPA or in groups. In any case data is verified per CPA and the verification status of each CPA is recorded by the coordinating/managing entity in the database. The coordinating/managing entity is in charge of the preparation of the Monitoring Reports and communication with the DOE during verification activities.

The Monitoring Report compiled all required monitoring information for all CPAs (sampled and individually verified) that is verified by the DOE. This report is unambiguously set out the data on emission reductions generated by each specific CPA during the monitoring period consistent with the requirements of this PoA-DD and the corresponding CPA-DD.

The monitoring plan for parameters is implemented for each CPA with assistance from the coordinating/managing entity as follows:

- CPA owner implements each CPA individually.
- The coordinating/managing entity provides guidance to the CPA owner on how the monitoring should be conducted and data should be collected in regard to the emission reductions calculations.
- The CPA owners provides data on monitored to the coordinating/managing entity.
- The coordinating/managing entity documents and stores all parameters provided by CPA owners in an electronic database, while primary data is stored by CPA owner. This data is kept for at least two years after the end of the last crediting period.
- The coordinating/managing entity reviews relevant monitoring documents, prepares the monitoring report, and provides the monitoring report to the DOE.

SECTION C. Demonstration of additionality of PoA

a) The proposed PoA is a voluntary coordinated action:
The proposed PoA is a voluntary and coordinated action, which promotes the development of small, run-of-the-river hydroelectric power plants by facilitating access to CER-based funding and facilities, encouraging renewable energy electricity generation in the country. There are no mandatory laws or regulations in the host countries stipulating to have recourse to CDM to develop hydropower facilities.

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

Each CPA demonstrates additionality in an independent way, following the PoA guidelines. This is appropriate since the various barriers to small hydro plants in the different regions of the host country may apply differently to different CPAs under the PoA.
The project participants reserve the choice of applying either: (a) the new EB regulation presented in Annex 23 of EB 63 which creates a platform for CDM projects located in “special underdeveloped zones” which are taken into account in this PoA or that are part of a list of technologies considered additional in the host country; or (b) investment analysis, using step 3 of the “Tool for the demonstration and assessment of additionality” version 07.0.0.

The most relevant national/Sectoral policies related to the PoA are:

- Energy Concession Law 25844[3]: The main law that regulates the electricity generation of the country.
- Regulation for Environmental Protection in Energy Activities N°29-94-EM[4].

[3] Web link: http://www.minem.gob.pe/minem/archivos/file/Electricidad/normatividad/dl25844.pdf (Law 25844 updated with the current modifications). Download at July 2011.

- Law for antitrust and oligopoly in the electricity sector[5].
- Legislative decree 1002[6]. Energy regulation to set renewable energy tenders and fixed prices for the projects that fulfils the requirements.

There is no energy, environmental or water regulation that considers the implementation of hydro power plants or a CDM PoA as mandatory. It can be seen in the webpages of the main institutions related to the electric market listed in Annex 3, that there is no internal, Sectoral or national regulation.

Hence, implementation of this PoA and avoidance of anthropogenic GHG emissions are additional to those that would have occurred in absence of this PoA. Thus, the PoA as a whole, once implemented, is expected to lead to greater promotion of small-scale renewable energy generation.

The main barrier to the development of small hydropower projects in Peru is the insufficient investment capital. The latest study of 2011 from the Energy Sector Management Assistance Program (ESMAP) of the World Bank[7] confirms the tendency of the Peruvian market and the final conclusions of other previous studies[8], which states that small hydro projects in Peru face investment barriers due to low tariffs based on the low cost of natural gas, lack of long term financing ("Access to finance is limited by the high transaction costs in relation to profitability of such small projects, and also by the lack of familiarity of banks with the project characteristics and issues that need to be appraised") and unrealistic risk assessments based on large hydropower. All of these barriers are in addition to the regulatory barriers like the tariff determination regulation, transmission costs regulation for hydro power plants, connection requirements, permits and licenses procedures; and technical barriers like lack of detailed guidelines on required levels of studies that lead to delays in the processes.

Each SSC-CPA is intrinsically different and may be affected in different level by these conditions. In order to make an objective assessment of additionality, the coordinating/managing entity has opted to use two approaches for this purpose:

Approach 1: Demonstrating additionality for CPAs up to 5 MW where:

a) The technology is recommended by the host country DNA (Ministry of Environment or MINAM) and approved by the Board to be additional in the host country, or;
b) The project is located in the areas indicated within the special underdeveloped zone of the host country identified by the appropriate national authority.

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[4] Web link: http://www.osinerg.gob.pe/newweb/uploads/Publico/2.DS-029-94-EM-Reg.Proteccin%20Amb.pdf. Download at April 2012.

[5] Web link: www2.osinerg.gob.pe/.../DS-017-1998-ITINCI-CONCORDADO.pdf. Download at April 2012.

[6] Web link: www2.osinerg.gob.pe/.../D.%20Leg.%201002-CONCORDADO.doc. Download at April 2012.

[7] ESMAP (2011). "Peru Opportunities and Challenges of Small Hydropower Development". Formal Report 340/11. Web Link of the document: http://www.esmap.org/esmap/sites/esmap.org/files/7747-ESMAP%20Peru%20English%20Web_4-11-11_0.pdf. Download at July 2011.

[8] "Análisis de Barreras y Facilidades para la inversion de Centrales Hidroeléctricas" or "Barrier and Incentive Analysis for the Investment in Hydro Power Plants" (Working Paper No 24, OSINERG).
http://www.osinerg.gob.pe/newweb/uploads/Estudios_Economicos/InversionCentralesHidroelectricas%20.pdf.
The study concludes that a small (less than 20 MW) hydro power plant is not financially viable, except for a limited number of projects that benefit from existing irrigation infrastructure or that have relatively high load factors and benefits from carbon finance. Download at July 2011.
"Peru. Institutional and Financial Framework for Development of Small Hydropower" 2008. World Bank, with financing from the World Bank's Energy Sector Management Assistance Program (ESMAP).
http://www.esmap.org/esmap/sites/esmap.org/files/Small%20hydro%20report%202008.pdf. Download at July 2011.
"Análisis de Barreras de Entrada para la Inversion en Centrales Hidroelectricas, OSINERGMIN, ESAN. July, 2008"
("Entry Barriers Analysis for the Investment in Hydroelectric Power Plants, OSINERGMIN, ESAN. July, 2008". ESAN is a university for graduate professionals (masters and PhDs, www.ue.edu.pe) and OSINERGMIN is the national energy supervisor entity ("Supervisory Commission for Investments in the Energy and Mining Sector" or "Organismo Supervisor de la Inversión en Energía y Mineria", www.osinerg.gob.pe). Source:
http://www.osinerg.gob.pe/newweb/uploads/Estudios_Economicos/Informe%20Final%20Barreras%20CH%20.pdf.

Download at July 2011.

A CPA is additional if it is able to demonstrate its additionality in accordance with Annex 23 to EB 63, “Guidelines for demonstrating additionality of micro scale project activities” version 3.

Approach 2: Investment Barrier

As per EB 63 Annex 24, Attachment A of Appendix B, SSC projects can demonstrate additionality trough different barriers, one of them the Investment Barrier, where it is demonstrated that a financially more viable alternative to the project activity would have led to higher emissions.

As per AMS I.D. “Grid connected renewable electricity generation” version 18, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. The national grid where the CPAS are connected (SEIN) is supplied by a mix of fossil fuel and renewable energy power plants leading to a grid emission factor of 0.7045 tCO_2/MWh for 2018

Taking the previous paragraphs into consideration, for demonstrating additionality for CPAs over 5 MW or not using Approach 1, the CME, in this case Carbonbay, develops the investment barrier option to proof the additionality of the projects.

The PoA uses a financial analysis based on the guidelines set in step 2 in the “Tool for the demonstration and assessment of additionality” version 6.0.0 and the recommendations made in the Guidelines on the assessment of investment analysis" version 05, in order to proof the existence of the investment barrier in the hydro power plant. These references are deemed appropriate since this additionality procedure considers all the specific characteristics of the project (input data for the IRR evaluation) and the energy market (benchmark).

According to the "Guidelines on the assessment of investment analysis", if the alternative to the project activity is the supply of electricity from a grid a benchmark approach is considered appropriate. Therefore, the analysis is developed applying the benchmark determined for the country, and the financial indicator that is used is the project internal rate of return (IRR) considering that hydropower projects generate financial benefits.

A sensitivity analysis is performed according to the recommendations of the “Guidance on the assessment of investment analysis”, where is stated that variables that constitute more than 20% of either total project costs or total project revenues should be subjected to this analysis.

If the CPA has a project IRR below the benchmark and if it is supported by a solid sensitivity analysis, the project is deemed to face investment barriers and is considered additional. In this case the CME can include the CPA in the Tunki PoA.
According to the Annex 13 of the EB 62, the “Guidelines for the demonstration and assessment of prior consideration of the CDM” do not apply to PoAs. The EB mentions that it is expected that no CPA part of the PoA commences prior to the start date of validation of the PoA. However, the EB recognize that this may indicate difficulties and requested the secretariat to provide options for further defining the start date of a programme and facilitating the prompt start of mitigation activities through programmes.

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

The criteria for assessing the additionality of any CPA includes the following:

For Approach 1: Micro scale projects

Demonstrating additionality for CPAs up to 5 MW can be done with either one

of the following options:

a) The technology is recommended by the host country DNA (MINAM) and approved by the Board to be additional in the host country, or;

b) The project is located in the areas indicated within the special underdeveloped zone of the host country identified by the appropriate national authority.

Table [number]: Fulfilment of criteria a) under Approach 1

Test a)	Yes	No
Is a technology recommended by the host country DNA (MINAM)	[X]	[X]

[(Conclusion of Test a):

Since the eligibility criteria is fulfilled by the CPA it is considered additional.
or
Since the eligibility criteria are not fulfilled by the CPA it is necessary to apply approach 1 case b).
or
At the moment of submitting this CPA there are no technologies approved by the CDM Executive Board and then option b) of the approach 1 is evaluated.]

Table [number]: Fulfilment of criteria b) under Approach 1

Test b)	Yes	No
CPA capacity is below or equal to 5 MW.	[X]	[X]
CPA is located in a geographical area that is classified as Poor o in Extreme Poverty by the SISFOH	[X]	[X]

The location ([name]) of the project activity is classified as xx in SISFOH system.
The location ([name]) and the [number] of the [number] surrounding communities ([percentage]): [names of communities], all located in a 5 Km radium from the project are classified as [Poor or in extreme poverty] in the SISFOH system.

Table xx: Condition of underdeveloped zone.

Indicator	Value	
District Name	[name]	
District Code		
Location	Condition	SISFOH Code
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]
[name]	[extreme poor, poor, not	[number]

Since the eligibility criteria of option xx are fulfilled by the CPA it is not necessary to apply approach 2

In conclusion the CPA is developed in an underdeveloped area in Peru and then is additional.
or
Since both eligibility criteria are not fulfilled by the CPA it is necessary to apply approach 2.

This additionality tests are based on annex 23 of EB63 according to which renewable energy projects are deemed additional if they have no more than 5 MW installed capacity and are located in a special underdeveloped zone of the host country or are part of a list of technologies/measures recommended by the host country DNA (where each of them have a ratio of installed capacity

equal to or less than 3 per cent compared to the total installed grid connected power generation capacity in the host country)[9].

For the purpose of this test, the size of the renewable project is determined as per the installed capacity. A formal approval is needed for the application of option a) and the definition of the special underdeveloped zone for option b) is according to the information of the Household Targeting System and Policy for Organization and Operation (Sistema de Focalizacion de Hogares y Directiva de Organizacion y Funcionamiento – SISFOH)[10] that was created by the Ministry of Economy and Finance (MEF). Every CPA has to evaluate its specific location in order to determine if it is in a locality classified as in extreme poverty or in poverty that is eligible for social programmes due to its structural and monetary poverty conditions. For a better approach under the Tunki PoA, the project is surrounded (approximately 5 km radium) by communities also in poverty situations (at least 50% of the surrounding communities are classified as poor or extreme poor). If these criteria are met, the CPA is placed in an underdeveloped area according to Peruvian data and option b) can be applied.

For Approach 2: Investment Barrier.

In the case of CPAs that do not comply with Approach 1 requirements, a financial analysis is performed based on the guidelines of Step 2 of the additionality tool version 6.0.0. The project Internal Rate of Return (IRR) is calculated and compared to a benchmark. Under this PoA the benchmark is the discount rate that represents the returns investors would normally expect in the host country.

For this PoA, the investment barrier, based on a financial analysis involving the calculation of the project internal rate of return (project IRR), has been selected to demonstrate the additionality of each SSC-CPA. Pursuant to the recommendations of the "Guidelines on the Assessment of Investment Analysis" version 05 (Paragraph 11), the financial analysis uses post-tax project IRR and benchmark.

Project IRR calculation

The project IRR calculation of the CPA is based on a list of economic parameters provided by the CPA owner that were available at the investment decision. This list of parameters includes:

Table: Parameters for calculation of project IRR

Parameter	Unit	Value	Sources	Comment
Technical Parameters				
Technical lifetime	Year	[number]	[description]	As per manufacturer specification or as per expert's opinion.
Construction start date	Year	[number]	[description]	-
Date project starts operating	Year	[number]	[description]	-

[9] At the moment of PoA registration the Peruvian DNA was in process of approval of the list of technologies with the first version of the"Guidelines for demonstrating additionality of microscale project activities". A formal letter was sent to the UNFCCC Secretariat on October 29th, 2010 with a formal letter of the National Dispatch Center (COES) where it can be seen that renewable sources up to 5 MW represent less than 0.5% of the annual generation for the last 5 years and has a decreasing rate of participation in the National Interconnected System (SEIN). The DNA is processing the version 3 of the guidelines and the "Procedure for Submission and Consideration of Microscale Renewable Energy Technologies for Automatic Additionality" released in EB 65, Annex 33. The option to assess the additionally criteria under this modality will be adopted when formally approved by the Board.

[10] Ministerial Resolution No 399-2004-PCM. Web Link.
http://sisfoh.mef.gob.pe/descargas/RM_399_400_2004.pdf. Download at August 2011.
This resolution is the continuation of the Supreme Decree No 130-2004-EF that establishes criteria to improve the social expenditures.

Annual electricity generation	MWh	[number]	[description]	As per guidelines for the reporting and validation of plant load factors (version 1).
Financial Parameters				
Electricity tariff	US / kWh	[number]	[description]	As per PPA if signed at date of investment or as per tariff published by the national authority.
Power tariff	US / kW	[number]	[description]	As per PPA if signed at date of investment or as per tariff published by the national authority.
Exchange rate	US / local currency	[number]	[description]	If some costs/revenues are provided in local currency the exchange rate as per date of investment decision is used to convert them into US.
Incomes				
Electricity	USD / year	[number]	[description]	Based on tariff and generation data.
Power	USD / year	[number]	[description]	Based on tariff and generation data.
Other Revenues	USD / year	[number]	[description]	To be included in the calculation only if applicable to the CPA.
Costs and Investment				
Total investment	USD	[number]	[description]	If the construction is expected to last several years, a yearly breakdown of investments can be provided.
Implementation technical studies	USD	[number]	[description]	Based on contracts or other formal evidence or reference.
Operation & Maintenance costs for the power plant and transmission line (including turbine periodic overhauls)	USD / year	[number]	[description]	Based on internal estimations and compared to similar Project information (if needed). If no specified otherwise, O&M is indexed using the consumer price index.

Payments OSINERGMIN	% of income per year	[number]	[description]	Executive Order 136- 2002-PCM dated 24/12/2002[11]
Contribution to COES	% of income per year	[number]	[description]	COES (Committee of Economic Operation of the System) Administrative Procedure 8A[12].
Water payments	% of electricity tariff per year	[number]	[description]	Law 25844 – Rulebook for the Electric Concessions Law. Article 214, Page 92[13].
Insurance	USD / year	[number]	[description]	Based on internal estimations and compared to similar Project information (if applicable and needed).
Salaries	USD / year	[number]	[description]	Based on internal estimations
Contingencies (investment and operation)	USD / year	[number]	[description]	Based on internal estimations and compared to similar Project information (if applicable and needed).
Land cost	USD / year	[number]	[description]	Based on contracts or other formal evidence.
Legal expenses	USD / year	[number]	[description]	Based on internal estimations and compared to similar Project information (if applicable and needed).
Depreciation	USD/year	[number]	[description]	Based on the national regulation for construction and equipment by SUNAT (Superintendence of Tax Administration). The depreciation rates are 30 years for civil works and 10 years for machinery and

[11] http://www.osinerg.gob.pe/newweb/uploads/JARU/CD/008fiscalizacion/ds136-2002-pcm.pdf – Web link last accessed on 10/10/2011.
[12] http://www.coes.org.pe/dataweb2/2008/DO/PROCEDIMIENTOS/Proced_admin_8a.pdf - Web link last accessed on 10/10/2011.

[13] http://www2.osinerg.gob.pe/MarcoLegal/pdf/REGLACE.pdf - Web link last accessed on 10/10/2011.

Residual Value	USD	[number]	[description]	Not applicable to hydro projects since the financial evaluation is for a horizon greater than the depreciation periods of equipment and civil works.
Other operating expenditures	USD / year	[number]	[description]	To be included in the calculation only if applicable to the CPA.
Benchmark				
Benchmark and return rate	%	12	[description]	

The load factor used in the calculation is according to [information provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval; or a third party contracted by the project participants (e.g. an engineering company)].

The calculations were performed using the standardized excel worksheet introduced by the PoA. [No variations are presented in that document or the following changes have been implemented in order to reflect the peculiarities of the project: xx]

The IRR is under the benchmark. CER incomes increase the profitability of the project, benefit all financial indicators, strengthen cash flows and reduce the risks of operation of this small power plant.

Parameters listed above are supported by valid evidence available for validation purposes. If there is a substantial gap (> 1 year) between the date of the investment decision and the date at which the corresponding document was compiled, the respective item is necessarily be inflated accordingly using the corresponding price index of the host country or the consumer price index of the host country as inflator.
The results of the calculations are:
Table [number]: Investment Barrier Analysis Results

Result	Unit	Value
IRR Without CERs income	%	[number]
IRR with CERs income	%	[number]

A standardized Excel worksheet has been developed by the CME into which data received from the CPA owner is entered, and which in turn compute the project IRR cash flow. A copy of the first version of the Excel sheet is provided to the DOE. The same Excel worksheet is used for all CPAs to be included in the proposed PoA. If the development of the project IRR for a CPA deviates from the latest version of the standard Excel table developed by the CME, any changes are described and explained in the respective CPA-DD[14].

Benchmark definition

[14] The CME keeps record of the evolution of the Excel worksheet.

In the case of Peru, the discount rate of 12% has been selected as a benchmark to evaluate the economic viability of an investment in the electricity sector in Peru. This 12% discount rate emerged in several studies as well as in official governmental decisions related to project investment evaluation. The discount rate is used by private stakeholder in the Peruvian electricity sector[15] as well as by the government, within the electric concession law, to evaluate new investments in the power sector.

The Electric Concession Law "Ley de Concesiones Eléctricas", Decree Law 25844 considers a specific discount rate for the electric sector and is used principally by the electric sector regulator assessing the opportunity cost of investment for the new additions to the system in order to forecast and determine the regulated tariff in Peru. In addition, there are several other governmental regulations not related to tariffs that use 12% as the rate for the opportunity cost for the evaluation of new investments and which reflect the minimum expected return for investments in the electric sector in Peru. Independent studies such as one performed by the World Bank in 2009 (Presentation of a World Bank Study regarding the Economic and Technical feasibility of Hydropower in Peru uses the benchmark of 12% as one to determine the viability of the projects[16]. Terms of reference developed by the Ministry of Energy and Mines for rural electrification projects formally considers 12% as the discount rate for project evaluation and comparison17. The investment guidelines for investment in electrification projects, developed by the Ministry of Economy and Finance, establish that private profitability indicators consider that the IRR calculation is with a 12% discount rate[17]. The Peruvian electric infrastructure company for rural electrification projects considers 12% as discount rate for renewable projects as stated in a document resuming the status of wind projects[18]. The Peruvian Central Reserve (BCR) issued the "Study for the electric supply BCR" dated September 2008 regarding the evaluation of future power additions in 2008- 2012 to the electric sector (in page 26 a discount rate of 12% for financial analysis of investment for power alternatives including hydropower)[19]. A study made by OSINERG in November 2005 related to the dynamics in electricity generation investment in Peru stated that investments are evaluated with a discount rate of 12%[20].

Previously Peruvian registered CDM projects forwarded a letter from the Peruvian DNA dated 22 July 2009 saying that there are several official documents of relevant institutions that consider the discount rate 12% adequate to evaluate the viability of a hydropower project and a letter from the Ministry of Energy and Mines, confirming that the 12% discount rate is used for private evaluation of energy projects in the National System for Public investment (that is not related to any type of energy tariff regulation or determination), and that is also used to forecast the referential plan for the next additions in the electric sector.

A copy of the concession law and other references has been provided to the DOE.

Sensitivity analysis

A sensitivity analysis is conducted using assumptions that are conservative from the point of view of analyzing additionality, i.e. the best-case conditions for the project IRR are assumed by altering the parameters that represent more than 20% of the cost or revenues by +/- 10%.

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[15] CDM registered projects have used this benchmark i.e. Rehabilitation of the Callahuanca hydroelectric power station (registration Nº:1245), Carhuaquero IV hydroelectric power plant (registration Nº:1424), La Virgen hydroelectric plant (registration Nº:1445), Poechos II hydroelectric plant project (registration Nº:1836), La Joya hydroelectric plant (registration Nº:1889), El Platanal (registration Nº:2426), Santa Cruz I Hydroelectric Power Plant (registration Nº: 2405), Huanza Hydroelectric Project (registration Nº: 4306), Yanapampa Hydroelectric Power Plant (registration Nº: 3545) and Santa Cruz II Hydroelectric Power Plant (registration Nº: 3337).

[16] http://siteresources.worldbank.org/INTPERUINSPANISH/Resources/EnriqueCrousillat_Sesion2.pdf. Download at July 2011.

[17] Web link. http://www.mef.gob.pe/contenidos/inv_publica/docs/instrumentos_metod/energia/Guia_Simplificada-Electrificacion_Rural.pdf. Download at July 2011.

[18] Web link: http://intranet2.minem.gob.pe/web/archivos/ogp/GVEP/velasquez.pdf. Download at July 2011

[19] Web link. http://www.bcrp.gob.pe/docs/Proyeccion-Institucional/Encuentro-de-Economistas/XXVI-EE-2008/XXVI-EE-2008- S10-Paper-Barco-Iberico-VeraTudela-Vargas.pdf. Download at July 2011

[20] http://www.osinerg.gob.pe/newweb/uploads/Estudios_Economicos/Dinamica%20de%20la%20Inversion%20en%20Generacion.pdf. Download at July 2011

The results of the sensitivity analysis are presented in the following table:

Table [number]. Sensitivity analysis result.

Parameter	+10%	-10%	Variation needed to reach the benchmark (%)
Investment costs	[number]	[number]	[number]
Energy sales income	[number]	[number]	[number]
(other)	[number]	[number]	[number]

Note1: if a different variation range is appropriate to the project, this is applied and justified
Note 2: explain the results for every parameter.
Note3: If the IRR exceeds the benchmark in one or more of the scenarios considered for the sensitivity analysis (+/- 10% variation), a clear explanation is presented to demonstrate that this situation is unlikely to happen. Also include statements on the likelihood of reaching/not reaching the benchmark and describe why it is unlikely that the particular change would occur

If the IRR exceeds the benchmark in one or more of the scenarios considered for the sensitivity analysis, a clear explanation is presented to demonstrate that this situation is unlikely to happen.
In addition the CPA owner calculates the "breakeven" values for the selected parameters (when the IRR is similar to the benchmark). The CPA owner includes statements on the likelihood of reaching/not reaching the benchmark and describe why it is unlikely that the particular change would occur.
Finally, if the CPA has an IRR below the benchmark that is supported by a solid sensitivity analysis, the project is deemed to face investment barriers, therefore is considered additional and can be included in the Tunki PoA

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

The registration date of the PoA was 28 Jun 2012.

D.2. Duration of PoA

28 years

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

Environmental Analysis is done at SSC-CPA level.

E.2. Analysis of environmental impacts

The environmental impacts of the project is detailed in every CPA. The particularities of each hydropower project, depending on the geographical location, capacity, and construction among others, justify a separate environmental description for each CPA.

In the case of Peru, according to the updated Energy Concession Law 25844 [21] for the development of hydroelectric power plants of over 500 kW it is needed a concession (Article 30), but generation with renewable sources up to 20MW does not requires the presentation of an

[21] Web link: http://www.minem.gob.pe/minem/archivos/file/Electricidad/normatividad/dl25844.pdf (Law 25844 updated with the current modifications). Download at July 2011.

Environmental Impact Assessment –EIA (Article 380). As a result, considering that all CPAs part of this PoA is under this limit, they are not legally required to present an EIA. The completion of an EIA or its approval is not required.

Even when an EIA is not required for the power plant project; the hydrological study considers a social and environmental evaluation. According to the Rules of Administrative Procedures for the Water Use Approval[22] of the National Water Authority (ANA, Autoridad Nacional del Agua), the National Service for Natural Protected Areas and the National Institute of Culture has to make a formal opinion in the case of hydrological studies for superficial water use (Article 5o). In addition, in Annex 4 of the document it is stated the minimum content of a typical hydrological study to be presented and social - environmental descriptions and analysis are required (E.g. access roads, socio economic parameters, geomorphology, ecological descriptions, water analysis, ecological flow, among others).

Transmission line's impacts are assessed in a separate basis. The Energy Concession Law considers that a concession is needed when the transmission facilities impact governmental assets and /or require the use of easement (right of way) for its implementation (Article 3o). In these cases, the regulation requires the approval of an Environmental Impact Assessment (Article 25o). The Ministry of Energy and Mines (MINEM) has the final decision about the necessity to submit an EIA or a DIA (according to the specific characteristics of the project).

E.3. Environmental impact assessment

Not Applicable

SECTION F. Local stakeholder consultation

F.1. Level at which local stakeholder consultation is undertaken

Local stakeholder consultation is done at SSC-CPA level

F.2. Modalities for local stakeholder consultation

Local stakeholder consultation is done at SSC-CPA level. Local and focalized impacts of each hydro project (depending on the location, capacity, and construction or not of dam among others) justify a local stakeholder consultation at CPA level.

The stakeholder comments are invited at the CPA level. The impact on the surrounding communities of small hydro plants depends entirely on the particular location, size and how the plant is embedded in its environment. Therefore, the CPA level is the adequate choice for inviting stakeholder comments.

Since stakeholder consultation processes for power plants are required only when a formal EIA is developed (according Peruvian laws[23], this PoA exceeds local regulations. In the case when a transmission line EIA is required, the results are described in the CPA – DD.

National regulation for CDM projects does not require the development of an investment plan for PoAs. This PoA considers that it is not mandatory to have a social investment plan for each CPA project, but encourages a positive relationship between the CPA owner and its community based on transparent and permanent communications that in several cases lead to special agreements between them. In these cases, all agreements are detailed in the CPA –DD. Local stakeholder consultation is done at SSC-CPA level. Local and focalized impacts of each hydro project (depending on the location, capacity, and construction or not of dam among others) justify a local stakeholder consultation at CPA level.

[22] Web link: http://www.ana.gob.pe/media/280744/reglamento_paoua.pdf. Download at July 2011.

[23] The Peruvian DNA only requires a formal process of communication of the PoA implementation. The coordinating/managing entity needs to submit the list of informed stakeholders. The DNA has no further requirements.

Even when the stakeholder process is at CPA level, the coordinating/managing entity has developed a general stakeholder consultation process with FONAM[24] as the entity in charge. The report made by FONAM, named "Inform about the Diffusion Activities for the PoA TUNKI"[25], details the process of determining and informing the stakeholders for the PoA.

Fonam identified 58 main actors/companies/institutions in the energy sector, and therefore send direct invitations to each one of their managers or representatives.

The general stakeholder consultation was developed in July 5th, 2011 on the Melía Hotel, Lima, Peru with 31 assistants.

The workshop had 3 presentations :
- "General Context of the Carbon Market and State of the Peruvian CDM Portfolio", by Julia Justo, Executive Director of Fonam
- "PoA –National and International Context", by Jorge Alvarez, UNDP.
- "Tunki Programme of Activities for Small Hydro Power Plants and Entities involved in the process", by Leddy Evangelista (representative of Mabanaft) and Fernando Miranda (representative of the CME).

In addition, direct communications (e-mails and physical letters) where held with 49 energy actors.

F.3. Summary of comments received

In the general stakeholder consultation, the comments where related to the benefits and special conditions for the potential CPAs. All comments where positive about the PoA implementation since the barriers for the small hydropower plants are widely known in the market and PoAs allow or facilitate CDM incomes for future hydropower plants. The persons raising a comment were:

-Pedro Gamio – Director of GVEP Latinoamérica. Congratulated about the programme implementation and detailing the main barrier in small hydro implementation in the country, that is equity and finance.
-José Yabar – Representative of Graña y Montero. Requested information about the costs of the process and the stage of the project implementation in order to be part of the PoA.
-Giacomo Zignago – University "Pontificia Catolica del Peru". About the programme suitability for all projects.

The responses of the letters (17) where positive about the PoA implementation, considering that it benefits for the future small hydropower plants, therefore facilitates the implementation of renewable energy in the country. The CDM barriers mitigation objectives, for small hydropower plants, were detailed in the responses as a positive consequence of the PoA.

F.4. Consideration of comments received

All the comments in the general stakeholder consultation were answered in the moment. The project participants described that can use their contact network to help the project owners in the financial process, that the programme costs are assumed by them, that there is no entrance fee

SECTION G. Approval and authorization

LoA Peru: 4/10/2012- CCC dated 24th March 2014
LoA Germany: LoA dated 19th March 2014
LoA Sweden: LoA dated 17th March 2013

[24] National Environment Fund. www.fonamperu.org.
[25] Informe sobre las Actividades de Difusión del Programa de Actividades de Pequeñas Centrales Hidroeléctricas: "TUNKI. July 2011. Version 1.0

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

Tunki Small Scale Hydropower Program of Activities

H.2. Reference number of generic CPA

PoA 6198[26]

H.3. Purpose and general description of generic CPA

The proposed CDM Programme Activity (CPA) “CPA title” is a Detail project condition with an (additional) installed capacity of installed capacity CPA connected to the national Peruvian electricity grid (SEIN). (Include any other important technical information of the project e.g. type of turbine, generation, technology).
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H.4. Technologies/measures

All CPAs under the PoA is small run-off-river hydro power plants with an installed capacity below or equal to 15 MW or hydro power plants with a capacity additions/retrofitting/replacement that not exceed 15 MW for the total final capacity of the facility, connecting to the Peruvian national electricity grid. Though, detailed technical characteristics differ, the following general conditions apply for all CPAs:

- The projects can be run-of-the-river with no more than a control reservoir, if any.
- Projects can result in new reservoirs or an increment in an existing one if the methodology conditions are fulfilled.
- Water is diverted to the power plant through the most environmentally friendly alternative viable while ensuring a minimum ecological flow according to national regulations.
- The water is conducted through a penstock to the powerhouse.
- One or more turbines and suitable generator(s) are located in one or more power houses.
- The facility supplies electricity to the electricity grid and, if applicable, to specific consumers.
- A discharge channel returns the water to the natural riverbed or water channel.

The proposed PoA is a Sectoral scope 1 programme (Energy industries, renewable - / non-renewable sources).

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The approved SSC baseline and monitoring methodology is AMS-I.D., version 18.0 “Grid connected renewable electricity generation”.

The grid emission factor of the host country is calculated using the “Tool to calculate the emission factor for an electricity system” Version 07, EB100, Annex 04.

The additionally is assessed based on attachment A of Appendix B of the Simplified modalities and procedures for small-scale CDM project activities (version 08) and the “Guidelines for demonstrating additionality of micro scale project activities” version 03. In addition, the PoA l

[26] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/8J56SG0WRNM7LZIUPC3DAYQXKBEFV1/view

applies the EB 63 Annex 24, Attachment A of Appendix B and uses a financial analysis based on the guidelines set in step 2 in the "Tool for the demonstration and assessment of additionality" version 7.0.0 and the recommendations made in the Guidelines on the assessment of investment analysis" version 05 to develop an appropriate investment evaluation for the hydro power plants that have to prove investment barriers.

Applicability of methodologies and standardized baselines. **The applicability criteria of AMS I.D. version 18 are the following:**	**Methodology AMS I.D. version 18 is applicable to an CPA under the proposed PoA because:**
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	A CPA consists of a renewable energy generation unit (hydro) that supplies electricity and displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit (thermal power plants connected to the national grid).
Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix.	CPA installs a new power plant, therefore the methodology AMS-I.D is applicable as per the same.
This methodology is applicable to project activities that (a) install a (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).	A new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity. Hence, the CPAs fall under options (a), (b), (c) and (d).
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; b) The project activity is implemented in an existing reservoir, 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; C) The project activity results in new reservoirs and the power density of the power plant, as per definition given in the Project Emission section, is greater than 4 W/m^2.	All CPAs for the Tunki PoA comply with conditions (a), (b) and (c). In case of the existence of reservoirs the power density is greater than 4 W/m^2.

If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel[27] the capacity of the entire unit shall not exceed the limit of 15MW.	Each CPA does only have renewable components and the capacity of the unit shall not exceed the limit of15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable, the proposed PoA does not include combined heat and power systems.
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[28] from the existing units.	In the case of CPAs including capacity additions, added units represent no more than 15 MW of power generation capacity and are physically distinct from the existing units.
In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	In the case of CPAs including retrofits or modifications, the total installed capacity of each CPA does not exceed the limit of 15 MW.
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.	Not applicable because the proposed PoA is limited to hydropower plants.
In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS-I.C.: Thermal energy production with or without electricity” shall be explored.	Not applicable because the proposed PoA is limited to hydropower plants.
In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply. The scrapping of replaced equipment should be documented and independently verified.	Not applicable because the proposed PoA is limited to hydropower plants.

I.2. Applicability of methodologies and standardized baselines

Not Applicable

[27] Co-fired system uses both fossil and renewable fuels.

[28] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered “physically distinct”.

I.3. Application of multiple methodologies

Not Applicable

I.4. Project boundary, sources and greenhouse gases (GHGs)

	Source	GHG	Included?	Justification/Explanation
Baseline	The Power Grid electricity production from the host country	CO_2	Included	According AMS.I.D. version 18 , only CO_2 emissions from electricity generation should be accounted.
		CH_4	Excluded	Minor emission source according to AMS.I.D. Version 18
		N_2O	Excluded	Minor emission source according to AMS.I.D. Version 18
Project activity	CPA electricity production	CO_2	Excluded	Minor emission source according to AMS.I.D. Version 18
		CH_4	Included	According to AMS.I.D. Version 18 this only be attributable to project with reservoirs when the power density is between 4 – 10 W/m^2.
		N_2O	Excluded	Minor emission source according to AMS.I.D.Version 18.

I.5. Establishment and description of baseline scenario

As per AMS I.D. "Grid connected renewable electricity generation" version 18.0, and because the project activity is the installation of grid-connected renewable power plant/unit (includes new, capacity addition/replacement/retrofit projects), the baseline scenario is

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid."

Following the methodology tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1), stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

Current baseline (operation of grid-connected power plants and by the addition of new generation sources) complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, thus go to Step 1.2.

The baseline scenario identified at the validation of the CDM PoA was the electricity delivered to the grid by the PoA, would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources into the grid. Thus this PoA was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. The CME was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for CME within their

scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Notwithstanding the impressive growth of Peruvian electricity sector, there are enormous scope of further improvements in projects those lead to GHGs emission reductions. As per International Renewable Energy Agency (IRENA), the Peruvian electricity mix is diversified, clean and of low cost. It consists of 54% renewable energy and 46% conventional energy. The current policies promote social inclusion, which has led to 92% of access to electricity and the current policy goal is to reach 99% of connectivity in 2019, by implementing a program to install 500.000 solar panel systems in rural areas. Peru aims to continue developing towards a low carbon energy mix, therefore for 2025 it has determined a new objective of 60% renewable energy and 40% gas in the electricity mix, securing access to electricity for the whole population. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources including hydroelectric energy.

Furthermore, the CME has considered latest available data (2018) of the Committee on Economic Operation of the Electric System (COES) regarding annually publics information of plants/ units generation and fossil fuel consumption in the Peruvian National Inter-connected Grid (SEIN) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances.

Step 1.2: Assess the impact of circumstances

Electricity delivered to the grid by the project activity would have still otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, i.e. no new circumstances make a continued validity of the current baseline not plausible.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. The project activity in green field project and there is no any baseline equipment or investment involved in project activity. Therefore this condition is not applicable to the project activity.

Step 1.4: Assessment of the validity of the data and parameters

This step stipulates that “Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor

Step 2: Update the current baseline and the data and parameters
As evident from the explanation provided above that the baseline scenario remains unchanged.

In line with the project standard version 02.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the

continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

The CPAs uses the AMS I.D. "Grid connected renewable electricity generation" version 18 as methodology for the emission reduction calculation. In accordance with the methodology, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. In order to calculate the grid emission factor, required by the methodology, the "Tool to calculate the emission factor for an electricity system" version 7.0 is used. The grid emission factor is updated by the coordinating/managing entity every year to consider the electricity system variations. This updated grid emission factor is available for CPA owners in order to estimate their periodical emission reductions.

Every CPA has to determine its condition as new power plant or retrofit/replacement/capacity addition power plant. For the determination of the electricity displaced from the electricity grid, new projects apply paragraph 11 and capacity additions/retrofits/replacements paragraph 15. The CPAs apply paragraph 12 for the determination of the grid emission factor.

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

All CPAs needs to monitor information in order to apply the formulas applicable for the calculation of the emission reductions attributable to the project operation (Grid emission factor and net electricity generation). In the other project types, the historic generation information and its standard deviation has to be determined and used as fixed value during the project crediting period.

The PoA applies the options listed in the methodology for new projects and for capacity additions, rehabilitations and retrofitting cases. The formulas and considerations are listed below.

PROJECT EMISSIONS (PE_y)

According to the methodology, project emissions are related to the operation of geothermal power plants, water reservoirs or on-site consumption of fossil fuels. Since the CPAs are not geothermal power plant or consumes fossil fuels, but may have reservoirs, the project emissions are:

Power plants with no reservoirs

Project emissions are considered zero.

$PE_y = 0$

Power plants with new reservoirs or that result in the increase of an existing one

Project emissions have to be considered following the procedure described in the most recent version of ACM0002 that is 19.0. And account for CH_4 and CO_2 emissions from the reservoir, estimated as follows:

If the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:
$PE_{HP,y}$

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

Where:
$PE_{HP,y}$: Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res} : Default emission factor for emissions from reservoirs of hydro power plants in year y (90 $kgCO_2e/MWh$)
TE_{Gy} :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)
If the power density of the project activity (PD) is greater than 10 W/m^2:

$PE_{HP,y} = 0$

The power density of a project activity (PD) is calculated as follows:

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

Where:
PD : Power density of the project activity (W/m^2)
Cap_{PJ} : Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} : Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
AP_J : Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
AB_L : Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

Basseline EMISSIONS (BE_y)

New Power Plants/Units

The following equation is used to calculate baseline emissions from electricity generation for a CPA implementing a new power plant:

$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$

Where:
BE_y : Baseline emissions from electricity generation in year y (tCO_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 (tCO_2/MWh)

Capacity Addition/Retrofit/Replacement Projects

a) Capacity Addition

The following equation is used to calculate baseline emissions from electricity generation for a CPA implementing a capacity addition power plant:

$BE_{capacity\ addition,CO2,y} = [EG_{BL,\ capacity\ addition,y}]*EF_{CO2}$

Where:
$EG_{BL,\ capacity\ addition,y} = EG_{PJ,facility,y} - (EG_{historical} + \sigma_{historical})$

b) Retrofit/Replacement

The following equation is used to calculate baseline emissions from electricity generation for a CPA implementing a retrofitting project:

$BE_{retrofit,CO2,\ y} = [EG_{BL,retrofit,\ y}]^* EF_{CO2}$ Where:

$EG_{BL,retrofit,\ y} = EG_{PJ,\ facility,y} - (EG_{historical} + \sigma_{historical})$

$EG_{BL,retrofit,\ y} = 0$ on / after $DATE_{BaselineRretrofit}$

In cases b.1. and b.2. the description of the parameters are:

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

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

$EG_{PJ,facility,y}$: Quantity of net electricity supplied to the grid by the project plant/unit in year y (MWh).

$EG_{historical}$: Annual average historical net electricity generation by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh). Average of historical net electrical energy levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5% or more), shall be used.
To determine historical $EG_{historical}$, project participants may choose between the following two historical periods (This allows some flexibility; the use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years):
The three last calendar years (five calendar years for hydro project) prior to the project implementation.
The time period from the calendar year following $DATE_{hist}$, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least three calendar years (five calendar years for hydro project), where $DATE_{hist}$ is latest point in time between:

- The commercial commissioning of the plant/unit;
- If applicable: the last capacity addition to the plant/unit; or
- If applicable: the last retrofit of the plant/unit

$\sigma_{historical}$: Standard deviation of the annual average historical net electricity supplied to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)

$DATE_{Baseline\ Retrofit}$: Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

Grid Emission Factor

To calculate the emission factor of the grid, two options are possible according to AMS I.D. “Grid connected renewable electricity generation”, version 18:

A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the Emission Factor for an electricity system' version 07 EB 100 Annex 4.
Or

The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used. Calculations must be based on data from an official source (where available) and made publicly available.

For all CPAs under this PoA option (a) is used for calculating the baseline. Data used to calculate the emission factors has been included in Annex 3 of this document.
The emission factor is determined according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system" version 07.0 following six 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 emission factor).
STEP 6. Calculate the combined margin (CM) emissions factor

Step 1: Identify the relevant electric power system

Each CPA supplies energy to the National Interconnected Electric Grid (SEIN), therefore, the identified electricity power system is the Peruvian National Electricity Grid (SEIN).

The Project displaces electricity from an electricity distribution system (in this case, the SEIN) that is or would have been supplied by at least one fossil fuel fired generating unit.

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

The tool provides 2 options, including:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation All CPAs uses Option I for calculating the grid emission factor.

Step 3: Select an OM method

Out of four options for the OM, the Dispatch Data Analysis OM (OM -DD) is selected as the option for all CPAs located in Peru. The Simple OM method cannot be used since low cost, must-run resources constitute more than 50% of total grid generation in Peru[29]. Also, it was not necessary to use either the Simple Adjusted OM approach or the Average OM approach because detailed dispatch data is available.

Step 4: Calculate the operating margin emission factor according to the selected method

The formula for the OM-DD emission factor ($EF_{grid,OM-DD,y}$) used was provided by the Tool as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum h EG_{PJ,h} * EF_{EL,DD,h}}{EG_{PJ,y}}$$

[29] COES Annual Statistics Report (2010) Table Nº 2.2A. According to this table, thermal generation in 2010 was 13 462.27 GWh, which represents 41.52%; while, hydro generation was 18 964.56 GWh, which represents 58.48%. Therefore, low cost, must-run resources constitute more than 50% of total grid generation in Peru. In internet http://www.coes.org.pe/wcoes/coes/estadistica/estadanual.aspx.

Where:
$EF_{grid,OM\text{-}DD,y}$:Dispatch data analysis operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{PJ,h}$: Electricity displaced by the CPA in hour, h, of year, y (MWh)
$EF_{EL.DD,h}$ = CO_2 emission factor for grid power units in the top of the dispatch order in hour h, in year y (tCO_2/MWh)
$EG_{PJ,y}$ = Total electricity displaced by the CPA in year, y (MWh)
h = Hours in year, y, in which the CPA is displacing grid electricity y = Year in which the CPA is displacing grid electricity

The hourly emissions factor is calculated based on the energy efficiency of the grid power unit and the fuel type used, as follows:

$$EF_{EL,DD,h} = \frac{\sum nEG_{n,h} \times EF_{EL,n,y}}{\sum nEG_{n,h}}$$

Where,

$EF_{EL,DD,h}$ = CO_2 emission factor for power units in the top of the dispatch order in hour, h, in year, y (tCO_2/MWh)
$E_{Gn,h}$ = Net quantity of electricity generated and delivered to the grid by power unit, n, in hour, h (MWh)
$EF_{EL,n,y}$ = CO_2 emission factor of power unit, n, in year, y (tCO_2/MWh)
n =Power units in the top of the dispatch.
h = Hours in year, y, in which the CPA is displacing grid electricity.

To determine the set of grid power units n that are in the top of the dispatch at each hour h, the power units were stacked using the merit order. The group of power units, n, in the dispatch margin includes the units in the top x% of total electricity dispatched in the hour, h, where x% is equal to the greater of either 10%, or

The quantity of electricity displaced by the project activity during hour h divided by the total electricity generations by grid power plants during that hour h

The CO_2 emission factor of power unit ($EF_{EL,n,y}$ is calculated as per the guidance for the simple OM, using the option A2.

$$EF_{ELn,y} = EF_{CO2,n,y,i,h} \times 3.6 / Nn,y$$

Where,
$EF_{ELm,y}$ = CO_2 emission factor of power unit n in year, y (tCO_2/MWh)
$EF_{CO2,n,y,i,h}$ = Average CO_2 emission factor of fuel type i used in power unit n in year y (tCO_2/GJ)

Nn,y = Average net energy conversion efficiency of power unit n, in year y, (ratio)
n = All power units serving the grid in year y expect low-cost/must-run power units
y = Applicable year during monitoring (ex-post option)

Step 5: Calculate the build margin (BM) emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units, m, during the most recent year, y, for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum mEG_{m,y} \times EF_{EL,m,y}}{\sum mEG_{m,y}}$$

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 power generation data is available

According to the "Tool to calculate the emission factor for an electricity system", version 07.0, the sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the vintage data selected above:

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 (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, 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 AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);

From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. Ignore steps (d), (e) and (f).

Exclude from SETsample the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set (SETsample- CDM) the annual electricity generation (AEGSET-sample-CDM, in MWh); If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. AEGSET-sample-CDM ≥ 0.2 × AEGtotal), then use the sample group SETsample- CDM to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

Include in the sample group SETsample-CDM the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

The sample group of power units m used to calculate the build margin is the resulting set (SETsample-CDM->10yrs).

Out of SET5-units and SET≥20%, the latter group was selected as SETsample due to the fact that it includes the larger annual electricity generation.

In terms of vintage data, to calculate the build margin Option 1 is chosen for the proposed Project;

Option 1: For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already

built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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:

Weighted average CM; or
Simplified CM.

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 projects at the starting date of validation; and
The data requirements for the application of step 5 above cannot be met.

The weighted average CM method (option a) should be used as the preferred option:

$EF_{grid,cm,y} = EF_{grid,om,y} \times W_{OM} + EF_{grid,bm,y} \times W_{BM}$

Where:
W_{OM} : Weighting of OM emission factor (%)
W_{BM} : Weighting of BM emission factor (%)

For the proposed PoA, the following default values are used: $W_{OM} = 0.25$ and $W_{BM} = 0.75$. .

LEAKAGE (L_y)

According to the applicable methodology, leakage calculation is considered if the energy generating equipment is transferred from another activity. Since the CPAs acquire new equipment, leakage is zero.

$L_y = 0$.

EMISSION REDUCTIONS ER_Y

The emission reduction attributable to the CPA during a given year y (ER_y) are the difference between the baseline emissions (BE_y) and project emissions (PE_y) and leakage emissions (L_y), as follows:

$ER_y = BE_y - PE_y - L_y$

Where

ER_y = Emissions reductions of the project activity during the year y in t CO_2e
$BE_{,y}$ =Baseline emissions during the year y in t CO_2e
PE_y = Project emissions during the year y in t CO_2e
LE_y = Leakage emissions in the year y in t CO_2e

I.6.2. Data and parameters fixed ex ante

Data/Parameter	$EG_{historical}$
Data unit	MWh
Description	Annual average historical net electricity generation by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity
Source of data	Information from the CPA owner or local authorities, based on the approaches listed in section B.1
Value(s) applied	Vary in every CPA
Choice of data or Measurement methods and procedures	Data from electricity meters of the CPA owner and official information is reliable and can be crosschecked.
Purpose of data	-
Additional comment	-

Data/Parameter	$\sigma_{historical}$
Data unit	MWh
Description	Standard deviation of the annual average historical net electricity supplied to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity.
Source of data	Based on CPA owner or local authorities information
Value(s) applied	Vary in every CPA
Choice of data or Measurement methods and procedures	Data from electricity meters of the CPA owner and official information is reliable and can be crosschecked.
Purpose of data	-
Additional comment	-

Data/Parameter	$DATE_{BaselineRetrofit}$
Data unit	Date
Description	Point in time when the existing equipment would need to be replaced in the absence of the project activity
Source of data	Date shall be determined according to “Tool to determine the remaining lifetime of equipment” version 01.
Value(s) applied	Vary in every CPA.
Choice of data or Measurement methods and procedures	Evidenced documents or references are used in order to determine a real and conservative date for future replacement of equipment.
Purpose of data	-
Additional comment	-

Data/Parameter	$DATE_{hist}$
Data unit	Date
Description	Point in time from which the time span of historical data for retrofit or replacement project activities may start.
Source of data	Project activity site information based on approaches listed in section E.6.2.
Value(s) applied	Vary in every CPA.
Choice of data or Measurement methods and procedures	Information is based on formal internal and/or external data.
Purpose of data	-
Additional comment	-

Data/Parameter	EF_{Res}
Data unit	$kgCO_2e/MWh$
Description	Default emission factor for emissions from reservoirs
Source of data	Decision by EB23
Value(s) applied	90 $kgCO_2e/MWh$
Choice of data or Measurement methods and procedures	CDM official information.
Purpose of data	-
Additional comment	-

Data/Parameter	Cap_{BL}
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data	CPA owner formal information or official information or estimation based on recognized standards.
Value(s) applied	Vary in every CPA.
Choice of data or Measurement methods and procedures	Based on formal information.
Purpose of data	-
Additional comment	-

Data/Parameter	ABL
Data unit	m^2
Description	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
Source of data	Project information based on topographical surveys, maps, satellite pictures, etc.
Value(s) applied	Vary in every CPA.
Choice of data or Measurement methods and procedures	Based on formal information.
Purpose of data	-
Additional comment	-

I.6.3. Modalities for ex ante calculation of emission reductions

According to the selected approved methodology (AMS – I.D. v.18.0), the results of applying the steps and formulas to determine the emission reductions are:

PROJECT EMISSIONS (PE_y)

[Describe the project conditions and justification to use one of the project emission options and calculate the project emissions attributable to the proposed CPA. The two potential options are listed below :)]

The proposed CPA is a new power plant and then project emissions are considered zero.

$PE_y = 0$

The proposed CPA is a power plant with new reservoirs or that result in the increase of an existing one and the power density of the project is:
PD: [number]W/m^2.

-Since the power density of the project activity (PD) is greater than 4 W/m2 and less than or equal to 10 W/m2 the projects emission were calculated and are estimated in:

$PE_{HP,y}$: [number]tCO_2e/yr

-Since the power density of the project activity (PD) is greater than 10 W/m2 the project emissions are zero:

$PE_{HP,y}$: 0 tCO_2e/yr

BASELINE EMISSIONS (BE_y)

The baseline emissions for [new / capacity addition/retrofit] power plants are the result of the multiplication of the following parameters.

(For New power plants:)

Calculation of the $EF_{grid,CM,y}$ (or $EF_{CO2,grid,y}$)

Calculate the operating margin emission factor according to the selected method The dispatch data analysis operating margin emission factor ($EF_{grid,OM-DD,y}$) is: [number] tCO_2/MWh.
Calculate the build margin emission factor

The build margin emissions factor ($EF_{grid,BM,y}$) is: [number] tCO_2/MWh. Calculate the combined margin (CM) emissions factor EF_y.
The combined margin emissions factor is: [number] tCO_2/MWh.

Net electricity Generation ($EG_{BL,y}$)

The net electricity generation of the project activity is listed in Table [number].

Table [number]. Net Electricity Generation

Year	$EG_{BL,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Baseline Emissions (BE_y)

The baseline emission which includes only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity are
$BE_y = EG_y * EF_{grid,CM,y}$

Table [number]. Baseline Emissions

Year	$BE_{y\ (tCO2/yr)}$
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

(For Capacity Addition Projects:)

Calculation of the $EF_{grid,CM,y}$ (or EF_{CO2})

a) Calculate the operating margin emission factor according to the selected method

The dispatch data analysis operating margin emission factor ($EF_{grid,OM-DD,y}$) is: [number] tCO_2/MWh.

b) Calculate the build margin emission factor

The build margin emissions factor ($EF_{grid,BM,y}$) is: [number]tCO_2/MWh. Calculate the combined margin (CM) emissions factor EF_y.
The combined margin emissions factor is: [number]tCO_2/MWh.

Quantity of net electricity supplied to the grid ($EG_{PJ,facility,y}$)

The Quantity of net electricity supplied to the grid is listed in Table [number]:

Table [number]. Net Quantity of net electricity supplied to the grid

Year	$GP_{J,facility,y}$ MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Annual average historical net electricity generation ($EG_{historical}$) and Standard deviation $\sigma_{historical}$)

The annual average historical net electricity generation of the project existing units and its standard deviation is listed in Table [number]:

Table [number]. Annual average historical net electricity generation and standard deviation

Year	$EG_{historical}$ (MWh)	$\sigma_{historical}$ MWh)
[number]	[number]	[number]
[number]	[number]	
[number]	[number]	
[number]	[number]	
[number]	[number]	
[number]	[number]	
[Average	[number]	

Net electricity supplied to the grid (EG BL, capacity addition,y)

The net electricity supplied to the grid is listed in Table [number]:

Table [number]. Net electricity supplied to the grid

Year	$G_{BL, capacity addition,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Baseline Emissions (BE_y)

The baseline emission which includes only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity are:

$BE_{capacity addition, CO2,y} = [EGBL_{, capacity addition,y}]*EF_{CO2}$

Where:

$EGBL_{, capacity addition,y} = EG_{PJ,facility,y} - (EG_{historical} + \sigma_{historical})$

Year	$E_{,capacity addition,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

(For Retrofit Projects :)

Calculation of the $EF_{grid,CM,y}$ (or EF_{CO2})

a) Calculate the operating margin emission factor according to the selected method

The dispatch data analysis operating margin emission factor ($EF_{grid,OM-DD,y}$) is: [number]tCO_2/MWh.

b) Calculate the build margin emission factor

The build margin emissions factor ($EF_{grid,BM,y}$) is: [number]tCO_2/MWh.

c) Calculate the combined margin (CM) emissions factor EFy.

The combined margin emissions factor is: [number]tCO_2/MWh.

Quantity of net electricity supplied to the grid ($EG_{PJ,facility,y}$)

The Quantity of net electricity supplied to the grid is listed in Table [number]:

Table [number]. Net Quantity of net electricity supplied to the grid

Year	$GPJ_{facility,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Annual average historical net electricity generation ($EG_{historical}$) and Standard deviation $\sigma_{historical}$)

The annual average historical net electricity generation of the project existing units and its standard deviation is listed in Table [number]:

Table [number]. Annual average historical net electricity generation and standard deviation

ear	$EG_{historical}$ (MWh)	$\sigma_{historical}$ (MWh)
[number]	[number]	[number]
[number]	[number]	[number]
[number]	[number]	[number]
[number]	[number]	[number]
[number]	[number]	[number]
[number]	[number]	[number]
Average	[number]	[number]

Net electricity supplied to the grid ($EG_{BL, retrofit ,y}$)

The net electricity supplied to the grid is listed in Table [number]:

Table [number]. Net electricity supplied to the grid

Year	$G_{BL,retrofit,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Determination of the date of baseline retrofit ($DATE_{BaselineREtrofit}$)

The point in time when the existing equipment would need to be replaced in the absence of the project activity is:

$DATE_{BaselineREtrofit}$: (Day/month/year)

Baseline Emissions (BE_y)

The baseline emission which includes only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity are:

$BE_{retrofit}$,$CO_{2,y}$ = [$EG_{BL,retrofit\ ,\ y}$]* EF_{CO2}

Year	BE, $_{retrofit\ ,y}$ (MWh)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

LEAKAGE (L_y)

According to the applicable methodology, leakage calculation is considered if the energy generating equipment is transferred from another activity. Since the project acquires new equipment, leakage is zero.

$L_y = 0$.

EMISSION REDUCTIONS (ER_Y)

The emission reduction attributable to the CPA during a given year y (ER_y) are the difference between the baseline emissions (BEy) and project emissions (PEy) and leakage emissions (Ly):

Table [number]. Emission Reductions

Year	ER_y tCO_2/yr)
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]
[number]	[number]

Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity	Estimation of baseline emissions	Estimation of leakage (tonnes of	Estimation of overall emission
Year A	[number]	[number]	[number]	[number]
Year B	[number]	[number]	[number]	[number]
Year ..	[number]	[number]	[number]	[number]
Total (tonnes of CO_2 e)	[number]	[number]	[number]	[number]

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{BL,y}$ / $EG_{PJ, facility, y}$
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y / Quantity of net electricity supplied to the grid by the project plant/unit in year y.
Source of data	Measured by electricity meter(s) to be specified in each CPA and or COES information
Value(s) applied	To be specified in each CPA.
Measurement methods and procedures	The net electricity supplied to the grid is measured continuously and recorded at least each hour according to COES requirements. A high level of accuracy of the measurements is achieved due to the use high-precision equipment calibrated and tested. In this section the project participants shall provide description of equipment used for measurement, its accuracy location (on site or at substation, according to specific characteristics of project). Every CPA defines detail the specific conditions to measure the electricity imported to the grid. The following cases, among others, may occur:
Monitoring frequency	- The net electricity is calculated by subtracting the electricity exported with the electricity imported by the CPA, both measured with calibrated meters. - The net electricity is calculated by subtracting electricity consumptions arriving not by the power plant transmission line (e.g. external lighting) listed in commercial invoices.
QA/QC procedures	Measuring energy equipment complies with updated national or IEC standards (at the moment of submitting the PoA-DD, energy meters shall be at least with a precision class of 0.2 according to COES regulation), 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 every three years. The meter readings may be cross-check with available internal and/or external information as electricity invoices or COES information. Since COES reports official information of the SEIN operation, in case of troubles with the energy readings or meter operation, COEs information
Purpose of data	-
Additional comment	Energy meters are property of the CPA owner unless it is justified otherwise due to technical conditions, regulatory framework, among others. Data is kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later. Complete information of every year during the crediting period is available by COES during the first six months of the following year.

Data/Parameter	TEG_y
Data unit	MWh/yr
Description	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year
Source of data	Project activity information
Value(s) applied	To be specified in each CPA.
Measurement methods and procedures	Value from electricity meters. Continuous measurement and monthly aggregation
Monitoring frequency	
QA/QC procedures	Measuring equipment is verified at least once every year.

	The meter readings may be cross-check with available internal and/or external information as electricity invoices.
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

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	Project site
Value(s) applied	To be specified in each CPA.
Measurement methods and procedures	Determine yearly the installed capacity based on recognized standards.
Monitoring frequency	-
QA/QC procedures	As reference, COES reports may be used for comparative purposes.
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	AP_J
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(s) applied	To be specified in each CPA.
Measurement methods and procedures	Yearly measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Emission factor for the Peruvian interconnected grid (SEIN)
Source of data	Official data provided by the administrator of the grid or the relevant National authority.
Value(s) applied	2018: 0.7045
Measurement methods and procedures	The baseline emission factor ($EF_{grid,CM,y}$) is calculated as a combined margin (CM), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BM,y}$) factors.
Monitoring frequency	---
QA/QC procedures	
Purpose of data	
Additional comment	The PoA CPAs will use the $EF_{grid,CM,y}$ calculated by the coordinating/managing entity with the most recent value. The value will be updated using official information from the administrator of the national grid when the information is available. Complete information of every year during the crediting period will be

	available by COES during the first six months of the following year. Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{grid,OM-DD,y}$
Data unit	tCO_2/MWh
Description	The Dispatch Data Analysis OM emission factor
Source of data	Official data provided by the administrator of the grid or the relevant national authority (COES) publicly available in its web site or directly sent to the coordinating/managing entity. Raw data for generation is based on the 15 minutes records of every power plant,
Value(s) applied	2018: 0.8583
Measurement methods and procedures	The dispatch data analysis operating margin emission factor ($EF_{OM-DD,y}$ = $EF_{grid,OM,y}$ in tCO_2/MWh) is a method which involves the power unit that are actually dispatched at the margin during each hour h, where the power unit are separated in power unit in the top of the dispatch n and other power unit.
Monitoring frequency	
QA/QC procedures	
Purpose of data	
Additional comment	Data will be kept for two years after the end of the crediting period or the Last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{grid, BM, y}$
Data unit	tCO_2/MWh
Description	The build margin emissions factor
Source of data	Official data provided by the administrator of the grid or the relevant national authority (COES) publicly available in its web site or directly sent to the coordinating/managing entity.
Value(s) applied	2018: 0.65320
Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	Official data provided by the administrator of the grid or the relevant national authority (COES) publicly available in its web site or directly sent to the coordinating/managing entity. 2018: 0.65320

Data/Parameter	$EG_{PJ,h}$
Data unit	MWh

Description	Electricity displaced by the project activity in hour h of year y
Source of data	Project records and/or COES
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	Directly measured and/or based on the information provided by COES. The proportion of data to be monitored is 100% and the data is archived electronically. The CPA specifies the value and measurements used (same value as $EG_{BL,y}$ / $EG_{PJ,facility,y}$ for new power plants and only the incremental electricity in the case on retrofitting, replacement and capacity additions).
Monitoring frequency	-
QA/QC procedures	Information of invoices of electricity sold to the grid is crosschecked with metered information and/or COES information. To ensure consistency, and if it is applicable other records may be used if it is necessary.
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Total electricity displaced by the project activity in year y
Source of data	Project records and/or COES
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	The proportion of data to be monitored is 100% and the data is archived electronically. The CPA has to specify the value and measurements used (same value as $EG_{BL,y}$ / $EG_{PJ,facility,y}$ for new power plants and only the incremental electricity in the case on retrofitting, replacement and capacity additions).
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{EL,DD,,h}$
Data unit	tCO_2/MWh
Description	CO_2 emission factor of power unit in the top of the dispatch order in hour h in year y
Source of data	Input data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	To calculate $EF_{EL,DD,}$h the second option is chosen because for the power units data on fuel consumption and electricity generation is available. The proportion of data to be monitored is 100% and the data is archived electronically.
Monitoring frequency	---
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EG_{n,h}$

Data unit	MWh
Description	Electricity generated and delivered to the grid by power units n in hour h
Source of data	Data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	The proportion of data to be monitored is 100% and the data is archived electronically.
Monitoring frequency	-
QA/QC procedures	Is official data.
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{EL,n,y}$
Data unit	tCO_2/MWh
Description	CO_2 emission factor of power unit n in year y
Source of data	Input data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	The $EF_{EL,n,y}$ is determined for method the simple operating margin option A.2. The proportion of data to be monitored is 100% and the data is archived electronically.
Monitoring frequency	---
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y
Source of data	Input data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	The proportion of data to be monitored is 100% and the data will be archived electronically
Monitoring frequency	-----
QA/QC procedures	Official data
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{EL, m, y}$
Data unit	tCO_2/MWh
Description	CO2 emission factor of power unit m in year y
Source of data	Input data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	The $EF_{EL,m,y}$ is determined for method the simple operating margin option A.2.. The proportion of data to be monitored is 100% and the data will be archived electronically
Monitoring frequency	----
QA/QC procedures	Official data
Purpose of data	-----
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$\eta_{n,y}$
Data unit	---
Description	Average net energy conversion efficiency of power unit n in year y (ratio)
Source of data	Data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	Each year this data is checked with the last available annual report of COES. The proportion of data to be monitored is 100% and the data is archived electronically.
Monitoring frequency	-
QA/QC procedures	If the data used is significantly lower than the default value of the applicable technology, CPA owner should assess the reliability of the values, and provide appropriate justification if deemed reliable. Otherwise, the default values above shall be used.
Purpose of data	

Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	$EF_{CO2,n,i,y}$
Data unit	$kgCO_2$ /TJ
Description	Average CO_2 emission factor of fuel type i used in power unit n in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Diesel Oil = 72,600, Residual Fuel Oil = 75,500, Natural Gas = 54,300 Coal = 87,300
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	Every update of IPCC reports is taken into account.
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	W_{OM}
Data unit	(%)
Description	Weighting of operating margin emissions factor
Source of data	As indicated in the "Tool to calculate emission factor for an electricity system"
Value(s) applied	The first crediting period, W_{OM} = 0.5 The second and third crediting period, W_{OM} = 0.25
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	W_{BM}
Data unit	(%)
Description	Weighting of build margin emissions factor
Source of data	As indicated in the "Tool to calculate emission factor for an electricity system"
Value(s) applied	The first crediting period, W_{BM} = 0.5 The second and third crediting period, W_{BM} = 0.75
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	For projects that are not solar or wind power generation. Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

Data/Parameter	Merit Order
Data unit	Text

Description	The merit order in which power plants are dispatched by documented
Source of data	Data provided by COES.
Value(s) applied	Data used is presented in the spreadsheet for Grid Emission Factor calculation.
Measurement methods and procedures	For each year, the variable cost of thermal plants in the SEIN that are in effect in December are used. The proportion of data to be monitored is 100% and the data will be archived electronically.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comment	Data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whatever occurs later.

I.7.2. Sampling plan

No Sampling is required.

I.7.3. Other elements of monitoring plan

The purpose of the monitoring plan is to measure and record the net electricity delivered to the electrical grid:

1. Management Structure and Responsibilities

The CPA owner is the overall responsible for daily monitoring and reporting of net electricity generation and has the obligation to follow the PoA requirements in its local management system. The manager of the proposed project is the responsible person for reporting the monitoring data in a monthly basis and assures the correct maintenance and operation of the measuring and monitoring equipment, including the existence of appropriate calibration certificates if necessary.

Data Collection: The electricity supplied by the project activity to the grid is measured by calibrated electricity meters. The parameter are monitored [at the project site and/or at the substation] and crosschecked with the invoices of electricity commercialized. Data is monitored continuously, recorded hourly and consolidated in a monthly basis as required by the applicable methodology.

Data Recording: All data collected is recorded monthly into an electronic spreadsheet.

Data Calibration: All measurements are conducted with equipment 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 Report: Data recorded (control value) and the invoices (main value) is consolidated on a monthly basis and is checked for quality control. If there are discrepancies in the data, the source of the variation is identified, whatever is the main measured value or the control value. The data report is consolidated monthly and is verified by the CPA owner´s Head Office.

Data Archives: The data recording, the data report and the invoices are archived, together with this monitoring plan. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period or the last issuance of CERs, whichever occurs later.

2. Data Quality Assurance and Control

An internal procedure to secure the correctness of data are employed. Data and reports are checked internally to secure correctness of data. In case of mistakes, corrective actions are applied to avoid future similar mistakes.

3. Training and Monitoring Personnel

All people that participate in the monitoring process are suitably qualified and trained in the operation and maintenance of the plant. They also receive a training session on the application of the monitoring plan.

4. Emission factor calculation

The combined margin emission factor used in the emission reduction calculation is the annually updated factor provided by the coordinating/managing entity. The factor uses information published by the local authorities.

5. Verification and Monitoring Results

The monitoring report is prepared by the coordinating/managing entity. It contains the data report, the emission factor calculation and the results of the emissions reductions of the project for a certain period.

Leakage monitoring:

No energy generating equipment is transferred from another activity developed in a non-Annex 1 Parties to this project and there is no existing equipment to be transferred to another activity.

The project activity involves electricity generation from hydro sources. The employed hydro energy generator can only convert hydro energy into electrical energy and cannot use any other input fuel for electricity generation. Thus, in no ways and means are required to monitor leakage from the project activity.

SECTION J. Crediting period type and duration

Start Date of Crediting Period	28/06/2019
Duration of Crediting Period	28/06/2019 to 27/06/2026
Type of Crediting Period	Renewable

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility criteria has been developed to meet the references in Standard. Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities Version 03.0 (paragraph 16), then a) applies to one or more small-scale projects forming a CPA, b) complies with all the relevant additionality-related guidelines, tools or any requirements embedded in the methodology (derived from all the relevant requirements of attachment A of Appendix B of the Simplified modalities and procedures for small-scale CDM project activities), c) are applicable to the technology involved and the used methodology and d) are verifiable.

A CPA to be included in the present PoA fulfils the following conditions:

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Geographical boundary .	Each CPA will be located within the	Unique GPS coordinates Please refer

		physical/geographical boundary of the PoA .	CPA DD 1 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/F05ERU9W4GVPJ8QSKBCYO2XA16NTDZ/view CPA DD 2 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/RFPBQX5AUOS820HIE3T1M6Y4NWD9LV/view CPA DD 3 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/YJIRBA9SCO2GMDPE0NLWK431HU5X7V/view CPA DD 4 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/6YZDI30FVUS5KNXHA7LMB8O9JGPQEC/view
2	Double Counting existing reservoir with no change in the volume of the reservoir; or where the volume of the reservoir is increased considering a final power,	Each CPA will not be involved in another registered or under validation as a CDM project activity or as a CPA under the proposed or another PoA or as other GHG reduction projects related to small hydro power project	Declaration of double counting check, Unique GPS coordinate .
3.	Other PoAs or projects	There is no other registered CDM project activity, included in another registered PoAs, deregistered project activities with the same identification data.	Declaration of double counting check, GPS coordinates, Analysis of projects in the CDM pipeline
4.	Technology/ Measure	Each small-scale CPA will introduce grid-connected hydro power project where the installed capacity of the plant is less than or equal to 15 MW Each CPA implementer will provide Manufacturer's specifications of hydro turbine facility/equipment and Standardized Power Purchase Agreement (SPPA) to describe the applied technology/measure.	Description of the technologies including expected lifetime, capacity, plant load factor, and any manufacturer specifications in CPA-DD; Standardized Power Purchase Agreement
5.	Start date.	Do not have a start date (as defined by the UNFCCC	Contracts for supplying turbines, contract for civil

		Glossary of Terms) before July 7th, 2011.Since the start date can be defined by different project milestone, the CPA owner provides formal documentary evidence to the CME for its evaluation when the start date has already occurred (e.g. contracts for supplying turbines, contract for civil works, payments set in PPAs, contracts with the entity financing the project, among others according to the project characteristics).	works, payments set in PPAs, contracts with the entity financing the project, among others according to the project characteristics, or licenses, among others
6.	Compliance with the applicability conditions of AMSI.D.	Each CPA will satisfy the applicability conditions for simplified baseline and monitoring methodologies as specified in the AMS-I.D. (Version 18.0) .	Applicability conditions of AMSI.D. (Version.18.0) Section B of CPA-DD .
7.	Additionality .	The CPA is able to demonstrate additionality with one of the options listed in section C, taking into consideration that approach 1 is only for projects up to 5 MW of installed capacity (list of technologies additional by default or CPA placed in an underdeveloped area). Any project over 5 MW demonstrates a financial additionality .	Decision based in the socioeconomic data of Peru as listed in the PoA, on a formal EB approval of additional technologies of the country, on technical reports, information submitted to banks or governmental institutions as part of the project implementation process, among others, to develop a financial analysis as part of the investment barrier additionality procedure.
8.	Local Stakeholder Consultation and Environmental Impact Analysis.	Each CPA will hold local stakeholder consultation before the inclusion in PoA and construction. Each CPA will conduct environmental impact analysis as per the national compliance .	Invitations evidences (letters, posters, photos, video), assistance list, agreement records, among others.
9.	Public Funding	Each CPA will provide an affirmation that funding from Annex I party, if any, does not result in a diversion of official development assistance.	Affidavit on No Public Funding from Annex 1 party
10.	Target Group	The target group of each CPA will be the connected to Peruvian electricity grid (Interconnected National Electric System or SEIN grid	CPA-DDs of all four CPAs Please refer to CPA DD 1 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/F05

			ERU9W4GVPJ8QSKBCYO2XA16NTDZ/view CPA DD 2 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/RFPBQX5AUOS820HIE3T1M6Y4NWD9LV/view CPA DD 3 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/YJIRBA9SCO2GMDPE0NLWK431HU5X7V/view CPA DD 4 https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/6YZDI30FVUS5KNXHA7LMB8O9JGPQEC/view
11.	Sampling	Not Applicable, Sampling procedures are not applied	Not Applicable,
12. .	Small-Scale Thresholds	The capacity of each hydro power project will not exceed 15MW over the entire crediting period as small-scale CDM project activities. In case of microscale CPA, the installed capacity of each hydro power project will not exceed 5MW over the entire crediting period.	Sworn declaration based on format developed by the CME
13.	Debundling Check	Each CPA is not a debundled component of a large scale project activity as per Para.15 of Methodological tool Assessment of debundling for smallscale project activities	Sworn declaration based on format developed by the CME

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
Organization name	Carbonbay GmbH & Co. KG
Country	Germany
Address	Große Theaterstr. 14, 20354 Hamburg, Germany
Telephone	+49 1733412363
Fax	+49 3222 196 9974
E-mail	registry@carbonbay.com

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
Website	http://www.carbonbay.com
Contact person	Wolfgang Brueckner

Appendix 2. Affirmation regarding public funding

The PoA and CPAs do not receive public funding.

Appendix 3. Applicability of methodologies and standardized baselines

No further information is presented

Appendix 4. Further background information on ex ante calculation of emission reductions

No further information is presented.

Appendix 5. Further background information on monitoring plan

No further information is presented.

Appendix 6. Summary report of comments received from local stakeholders

No negative comments received from local stakeholders. Please refer section E of the PDD

Appendix 7. Summary of post-registration changes

The type of Post-registration changes made in this document is 'permanent changes- Corrections' as per CDM Project standard version 9.0 paragraph 275.

The project underwent Post Registration changes via PRC-6198-002.
The CME of the PoA is changed to Carbonbay GmbH & Co. KG.

Under the section - Grid Emission factor of the initial PoA DD, to calculate the build margin emission factor, the project participants has chosen 'Option 1' which is calculating it ex ante based on the most recent information available on units already built for sample group at the time of CDM-PDD submission to the DOE for validation. However the parameter '$EF_{grid,BM,y}$' is mentioned erroneously under the section - data and parameters to be monitored by each SSC-CPA. This parameter has been now been indicated under the right section – B.6.2 in the PoA DD as to be measured ex-ante.

The possible registration date of the PoA mentioned in the earlier PoA DD was 30 June 2012 which is changed to the actual registration date which was 28 Jun 12.
There has been a correction with the formula used for the Baseline Emission calculation for capacity addition plants. The baseline emission calculation formula in the initial PoA DD version 1 is mentioned for a retrofit project which has been changed to the formula for a capacity addition project.

There were some grammatical changes made as well in this version of PoA DD. There were some typographical errors with the parameters used in the calculation of operating margin emission factor which have been corrected now. The parameters $EG_{m,y}$ and $EFEL_{,m,y}$ were also removed from the parameters to be monitored as they are used for calculation of Build margin emission factor which is a fixed ex-ante value.

Document information

Version	*Date*	*Description*
09.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN); • Make editorial improvements.
08.1	28 June 2017	Revision to: • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: • Ensure consistency with the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Programme design document form for small-scale CDM programmes of activities" (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.

Version	*Date*	*Description*
04.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6).
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: programme of activities, project design document