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

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NOTE:

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

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

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

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

Hydro Alliance Programme of Activities

Version 2
Date: 02/10/2012

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

Central America has a large and virtually untapped hydropower potential that could be energy sources for small hydropower plants. The demand for electricity is increasing in Central America. Small hydropower development is an attractive energy solution that can meet the growing demand for electricity in the region.

The Central American Sustainable Energy Strategy 2020[1] (approved by the Central American Ministers of Energy, during a meeting in Guatemala City on November 13th, 2007), states that the Central American energy supply system presents several technical and economic inefficiencies that represent price increases for final consumers. The estimated potential of hydro resources in Central America is 22,068 MW of which only 17% is being used. Electrical demand grew 71% from 1995 to 2006. The market-share of hydro resources, however, decreased from 70% in 1990 to 55% in 2006. In contrast, the market share of thermal generation based on fossil fuels increased from 30 to 45% in the same period[2]. This trend is particularly high in El Salvador and Guatemala, as shown in Figure 1.

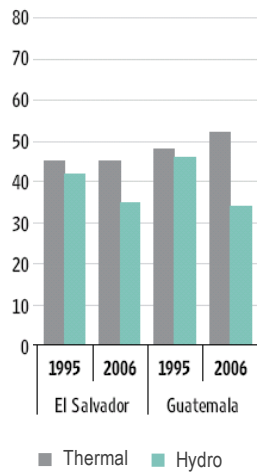


Figure 1. Ratio between thermal and hydroelectric installed capacity, 1995 and 2006 [3]

[1] Central American Sustainable Energy Strategy 2020 – Economic Commission for Latin America (ECLA),General Secretariat of the Central American Integration System. 2007.
[2] State of the Region on sustainable human development summary 2008 / Program State of Nation. – San José C.R.: the program, 2008.
[3] State of the Region on sustainable human development summary 2008 / Program State of Nation. – San José C.R.: the program, 2008.

The huge potential for hydro-generation which is not being utilized, in addition to the decrease of the share of hydro resources in the energetic matrix of the host countries in the last years, suggest that in the absence of the proposed PoA the total amount of electricity generation from hydro resources will continue to be very low.

1. General operating and implementing framework of PoA

The Hydro Alliance Programme of Activities (PoA) (henceforth The Alliance PoA) will support the development of new, small-scale, grid-connected-hydropower plants in the Republic of El Salvador and in the Republic of Guatemala. The SSC-PoA supports hydropower plants delivering energy to the main grids. Each SSC-CPA under this SSC-PoA will comprise one or more than one hydropower plant with a combined installed capacity of no more than 15 MW - the threshold for small-scale CDM projects. The Alliance PoA is a voluntary action being coordinated and managed by *Negocios Energeticos de Occidente S.A.* (henceforth Neosa or CME), the Coordinating and Managing Entity. The CME will work closely with South Pole Carbon Asset Management Ltd (henceforth, South Pole), the developers of the hydropower plants (henceforth, Project Implementer), *Grupo Financiero de Occidente* (GFO) and other financial institutions to facilitate the development of new power plants and their inclusion in the SSC-PoA.

2. Policy/measure or stated goal of the PoA

This SSC-PoA is motivated by the paradoxical situation of the hydropower industry in Central America: In spite of abundant hydropower resources, hydropower contributes only a small share to Central America's power generation.

The Central American Sustainable Energy Strategy sets the specific goal of reducing the dependence of oil in the electricity generation process via the elimination of barriers to renewable sources and the implementation of a price policy to promote the use of renewable sources. It suggests that in order to reach this goal, private and mixed investments that support economic and financial mechanisms designed to promote renewable sources and energy efficient technologies must be developed, and the energy sector and the institutions responsible of environmental monitoring must be strengthened.

Nevertheless, these measures have not been sufficient to kick-start the hydropower industry in Central America. As a result, the development of new hydropower plants remains slow despite its huge potential as a source of clean energy.

In view of the energy challenges that Central American countries are facing, inter-regional and integrated polices for commercialization and consumption of the energy resources should be developed and promoted. Specifically, these items should be promoted: the use of renewable sources, energy-efficiency programmes, and the Central American Interconnected System.

The objective of the Alliance PoA is to develop a platform that can support the development of sustainable, small hydropower projects in the region. To reach this goal, Neosa will raise awareness among Central American hydropower developers on opportunities for generating CDM revenues and provide standardized and streamlined access to CDM services for hydropower projects in Central America, focusing on small projects that otherwise would not be able to generate CDM revenues. Neosa will coordinate the inclusion of the CPA in the PoA, conduct the inclusion to the PoA of the CPA, provide monitoring and verification services to all CPAs, and support the effective commercialization of CERs. Neosa intends to provide comprehensive technical and financial advisory for the effective

development of the hydropower projects within the host countries.

In this way, the Alliance PoA will promote the development of renewable energy and facilitate the mitigation of greenhouse gas (GHG) emissions through displacing grid electricity.

The contribution of the Alliance PoA to sustainable development is assessed by using the sustainable development criteria of the Central American Alliance for Sustainable Development[4]. The Central American Alliance for Sustainable Development defines sustainable development as a progressive change in the quality of life of human beings through economic growth with social equity and the transformation of the production methods and consumption patterns that support the ecological equilibrium and the region's vital support.

The SSC-PoA and their associated SSC-CPAs generate numerous environmental, economic, social and technological benefits:

Environmental benefits:

- The SSC-PoA encourages the development of hydropower plants that replace non-renewable energy (typically energy generated from fossil fuels) with renewable energy, reduces emissions of pollutants (per unit of energy generated), including GHG emissions.
- In contrast to most other sources of power, the SSC- CPA produces no solid waste end products (e.g. ash); it addresses the problem of solid waste disposal encountered by most other sources of power.
- When used to generate electricity, hydro energy contributes to resource conservation.
- The SSC-CPA produces sustainable energy via the use of a renewable energy resource: water.
- The SSC-PoA and their associated SSC-CPAs causes no negative impact to the surrounding environments.

Economic benefits:

- The SSC-PoA increases employment opportunities in the area where each SSC-CPA is located, leading to a general increase in local-community income.
- The SSC-PoA/CPA enhances the local investment environment and improves the local economy.
- The SSC-PoA diversifies sources of electricity generation that are necessary to meet a growing demand for energy and facilitates the transition away from diesel/coal electricity generation.
- The SSC-PoA contributes to poverty alleviation through income and employment generation (local people will be employed throughout the project operation or each SSC-CPA).

Social benefits:

- The SSC- CPA promotes sustainable development of the region.
- The SSC- CPA improves access to electrical power in rural regions by increasing access and quality of electricity in the distribution network.
- During civil work, the SSC- CPA generates employment opportunities for the local population (in addition, various types of mechanical work generate employment on regular and permanent basis).

[4] Conference of Central American Presidents (Ecological Conference). Managua, Nicaragua, October 12th, 1994. *Sistema de Integración Centroamericana. Cumbre Ecológica Centroamericana.*

Technological benefits:

- The SSC- CPA supports technology/know-how transfer from other regions/countries via training and practical work experience.
- Because replacement parts are needed on a timely basis to ensure the smooth operation of the hydropower plants, the SSC- CPA encourages local production of spare parts in the region.

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

The Alliance PoA is a voluntary action being coordinated and managed by Neosa. There are no mandatory laws or regulations in place in any of the host countries that are part of the PoA 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 SSC-PoA for hydropower plants in such countries.

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

1. Neosa[5] will be the Coordinating andManaging Entity[6] for the project activities under the Programme of Activities (PoA). Neosa will communicate with the CDM Executive Board.
2. Project participants being registered in relation to the PoA are:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Guatemala (host)	*Negocios Energeticos de Occidente S.A.* (Neosa)	No
Switzerland	South Pole Carbon Asset Management Ltd. (South Pole)	No
El Salvador (host)	*Negocios Energeticos de Occidente S.A.* (Neosa)	No

Project participants may or may not be involved in the SSC-CPAs included in this SSC-PoA.

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

A.4.1. Location of the programme of activities:

The SSC-PoA covers the geographical region of the Republic of El Salvador and the Republic of Guatemala.

A.4.1.1. Host Party(ies):

[5] Also referred to "Coordinating and Managing Entity" or "CME".
[6] The Coordinating and Managing Entity shall be a project participant authorized by all participating host country DNAs involved and identified in the modalities of communication as the entity which communicates with the Executive Board, including on matters relating to the distribution of CERs.

Republic of El Salvador (El Salvador) and the Republic of Guatemala (Guatemala).

A.4.1.2. Physical/ Geographical boundary:

The Hydro Alliance PoA will be developed within the territory of Central America in the following countries: El Salvador and Guatemala.

Central America is the central geographic region of the Americas; it is the isthmus than connects North and South America, and it includes seven countries.

The location of which the CPAs will be implemented will be defined in the SSC-CPA-DD. As a general guidance, the geographical coordinates of the capital city of each host country are:

Guatemala City: 15.6100 N and -90.5300 W
San Salvador: 13.7200 N and -89.1500 W

A map indicating the location of the PoA is provided in Figure 2.

Figure 2. Map of Central America
Source: Google Earth

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

A typical SSC-CPA under this SSC-PoA comprises one or more small hydropower plants with an installed capacity not exceeding 15 MW. Project Participants define hydropower as a system that harvests the force or energy of moving water.

The hydropower plants are constructed by one or more third-party project owners and generate electricity from hydropower. The energy generated by the SSC-CPAs will be connected to the national grid of the host country (either, El Salvador or Guatemala).

Although detailed technical characteristics will differ, the following types of power plants and general conditions will apply for all SSC-CPAs:

- Installation of new small hydro power plants;
- Capacity addition of existing hydropower plants;
- Replacement of existing small hydro power plants;
- Retrofit of existing small hydropower plants;

- Small hydropower plants with a reservoir or dam with a total power density greater than 10 W/m^2

All SSC-CPAs will apply version 17 of AMS I.D and will have an installed capacity of 15 MW or below.

Technology transfer

A hydropower project requires very specific, high-tech equipment to run it such as a special turbine, generator and alternator. Operational success demands specific knowledge on how to design and operate the plant. Because most of the equipment and know-how cannot be secured locally, the bulk of the equipment required for the SSC-CPA's construction will be imported from abroad (from Annex-I and non Annex-I countries), resulting in a transfer of technology.

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

The proposed SSC-PoA falls in the type I scope 1 (Energy industries (renewable - / non-renewable sources) category.

The SSC-PoA will employ all hydro technologies that harvest the kinetic or potential energy of water. It may include technologies (but not limited to) such as Pelton, Kaplan, Turgo, Francis turbines, etc. The technologies employed may differ from one SSC-CPA to the next, and may comprise *inter alia* barrages, diversion tunnels, fore bays, spillways, pressure pipes, powerhouses, and booster stations.

The specific technology to be employed by each SSC-CPA is described in the SSC-CPA-DD form. However, as a general guidance the following descriptions are applied:

Hydropower plants grid connected.
The energy generated by the hydropower plant is supplied to the national grid of either El Salvador or Guatemala.

Capacity addition.
A capacity addition shall consist of an increase in the installed power generation capacity of an existing power plant through: (i) The installation of a new power plant besides the existing power plant/units; or (ii) The installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the SSC-CPA.

Replacement.
It involves investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The installed capacity of the new plant or unit is equal to or higher than the plant or unit that was replaced.

Retrofit.
It consists of a rehabilitation or refurbishment. It involves an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

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

A SSC-CPA to be included in the proposed SSC-PoA shall comply with the following eligibility criteria, based on the requirements of the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities (version 01.0)[7]"

Topic	Eligibility criterion	Evaluation criterion
Geographical boundary	1 The SSC-CPA must be a hydroelectric plant located within the geographical boundary of either one of the host countries (Republic of El Salvador or the Republic of Guatemala).	Project description and geographical co-ordinates of the SSC-CPA.
Double counting	2 The inclusion of the SSC-CPA in the SSC-PoA should not lead to double counting of the emissions reduction.	- Unique geographical co-ordinates. - Confirmation from CPA owner on not applying as an individual CDM project, neither being part of any other PoA. A check on the CDM website among registered projects and projects under Validation.
Technology	3 The SSC-CPA must consist of a hydroelectric power project, connected to the national grid of either El Salvador or Guatemala; and that comprises any technology that harvest the kinetic or potential energy of water. These can include capacity additions, replacements and retrofits.	Detailed project report, quotation from technology provider, purchase order, EPC, feasibility study or any other similar information assessed or evaluated by a third party.
Project Start date	4 The SSC-CPA must have a project start date in compliance with the definition of "Start date" as per the CDM Glossary of Terms (version 6) and after the PoA validation start date (which is the date in which the PoA-DD, generic SSC-CPA-DD, and specific SSC-CPA-DD were submitted to the UNFCCC for public comments, May 4, 2011).	Start date of CPA can be verified from Equipment Purchase Contract or any applicable available document. The criteria will comply with the CDM requirements that are defined as: "The starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins."
Compliance with applied methodology	5 The SSC-CPA must comply with all applicability conditions defined in the methodology AMS I.D. version 17.	Compliance to all requirements listed in section E.2
Additionality	6 All SSC-CPAs must comply with one of the additionality tests outlined in section E.5.1 and detailed in section E.5.2 of the SSC-PoA-DD.	To be taken into account and described in the CPA-DD section B.3.

[7] EB 65 Annex 3.

		a) Projects with an up to 5 MW of installed capacity and located in a Special Underdeveloped Zone (SUZ) of the host country are automatically additional[8]. b) For all the projects that do not fulfill the characteristics described in point a above, the project IRR must be lower than a benchmark in order to be deemed additional.	The CPA-DD will be deemed additional if it complies with one of the eligibility criteria for aditionality. a) Projects with an up to 5 MW of installed capacity and located in a special underdeveloped zone of the host country are automatically additional. b) For all the projects that do not fulfill the characteristics described in point above, the project IRR must be lower than a benchmark in order to be deemed additional.
Local stakeholder consultation	7	A local stakeholder consultation must have been conducted.	As per provided description of local stakeholder invitation, summary of comments received and how they have been taken into account, in the CPA-DD section D.
Environmental Impact Analysis	8	The SSC-CPA must comply with relevant environmental requirements applicable at the time of inclusion of the SSC-CPA into the SSC-PoA.	- Policies showing that an environmental impact analysis is not required or; - Environmental impact analysis report outlined in section C of the SSC-CPA-DD.
Diversion of official development assistance	9	The SSC-CPA should not result into the diversion of official development assistance.	Declaration from CPA implementer and if available, loan funding documents.
Target group	10	The SSC-CPA must be a project activity that will: a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); b) involve a capacity addition; c) involve a retrofit of (an) existing plant(s); or d) involve a replacement of (an) existing plant(s).	Detailed project report, quotation from technology provider, purchase order, EPC, feasibility study or any other similar information assessed or evaluated by a third party.
Target group	11	The SSC-CPA must export the generated	Power Purchase Agreement, Letter

[8] The definition of Special Underdeveloped Zone (SUZ) is taken from the EB 68 Annex 26 paragraph 2.a i): SUZ is a region in the host country (zone, municipality or any other designated official administrative unit) identified by the Government in official notifications for development assistance including for planning, management, and investment satisfying any one of the following conditions using most recent available data:

- the proportion of population with income less than 2 USD per day (purchasing power parity) is greater than 50%, or
- the GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures.

		renewable electricity to a relevant and clearly identified grid within the geographical boundary of El Salvador or Guatemala.	of Understanding with a potential buyer, authorization of interconnection issued by the grid company, or similar.
Target group	12	If the power plant comprises a reservoir[9], the power density of the power plant shall be greater than 10 W/m^2.	Calculations performed on the basis of Detailed project report, feasibility study, or any other similar source assessed or evaluated by a third party.
Small-scale threshold	13	Generates electricity with a capacity below or equal to the type I small-scale threshold during the whole crediting period of the SSC-CPA. In case of a capacity addition/retrofit/replacement activity at an existing hydropower plant the electricity generation by the total installed capacity must be below the type I small-scale threshold during the whole crediting period of the SSC-CPA. SSC-CPAs that fall into this category, shall comply with the requirements of the Guidelines on the Demonstration of Additionality of Small-Scale Project Activities, version 9. This requirement must be fulfilled in case CPA is following additionality test b, as described in section E.5.2 of the PoA-DD. If additionality test a is done, this eligibility criterion does not need to be considered.	Detailed project report, EPC, feasibility study or any other similar information assessed or evaluated by a third party. For each monitoring period the CPA owner must provide the CME with a declaration under oath that the SSC-CPA remains within the 15 MW threshold. Additionally, during each verification visit the CME will check the total installed capacity to ensure that it remains under the threshold of 15 MW.
Micro-scale threshold	14	As per the Guidelines for Demonstrating Additionality of Microscale Project Activities version 4, CPAs with a total maximum installed capacity below or equal to 5 MW shall be considered “Microscale CDM Project Activities” and must fulfil the requirements of such guidelines. If additionality is proven by test a, the total installed capacity of the SSC-CPA must remain within the microscale threshold during the whole crediting period. This requirement must be fulfilled in case CPA is following additionality test a, as	As per details in CPA-DD and corresponding supporting documents. If additionality is proven by test a, for each monitoring period the CPA owner must provide the CME with a declaration under oath that the SSC-CPA remains within the 5 MW threshold. Additionally, during each verification visit the CME will check the total installed capacity to ensure that it remains under the threshold of 5 MW.

[9] Please note that for calculation and eligibility criteria purposes, regulation tanks will be considered as reservoirs.

		described in section E.5.2 of the PoA-DD. If additionality test b is done, this eligibility criterion does not need to be considered.	If additionality is proven by test b, the evaluation criteria stated in eligibility requirement 13 above shall be applied instead.
De-bundling check project activity:	15	The SSC-CPA included in the SSC-PoA must not a de-bundled component of another CDM programme activity (CPA) or CDM project activity[10]. SSC-CPA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity, which satisfies both conditions (a) and (b) below: (a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and; (b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.	- If applicable, project list of same activity implementer as CPA implementer, applying the same technology/measure. - If applicable, list of CPAs of a large scale PoA with the same coordinating and managing entity applying the same technology / measure. GPS coordinates of above projects near to the implemented CPA.
Others required by the CME	16	Have an agency contract with the CME that governs the SSC-CPA's participation in the Hydro Alliance PoA, and comply with the code of conduct of the CME	Contract with the CME.
Others required by the CME	17	Provide a letter of compliance for the project activity, issued by the DNA, if required by the internal procedures of the DNA.	Letter of compliance, only if applicable.
Others required by the CME	18	In the case of a SSC-CPA that involves the replacement of existing equipment at the project site; the replaced equipment must be scrapped or destroyed. The scrapping of the replaced equipment must be monitored and documented by an independent Party. The SSC-CPA shall not consider the installation of existing equipment transferred from another hydropower plant.	Detailed project report, feasibility study, purchase order, or any other similar information assessed or evaluated by a third party that shows that the SSC-CPA will not comprise the installation of existing equipment transferred from another hydropower plant. In case of replacement of existing equipment at the project site, a quotation from scrapping facility or final waste disposal site, or proofs of such disposal are required.
Others required by the CME	19	In the case of a SSC-CPA that involves the addition of renewable energy generation units at an existing renewable power	Detailed project report, quotation from technology provider, purchase order, EPC, feasibility study or any

[10] Please notice that as per Guidelines on Assessment of De-bundling for SSC Project Activities issued version 3 (EB54 annex 13), only hydropower projects with a size greater than 150 kW will perform the de-bundling check.

	generation facility, the added generating units must be capable of generating electricity without the operation of existing units, and must not directly affect the mechanical, thermal, or electrical characteristics of the existing facility.	other similar information assessed or evaluated by a third party.

Please notice that the eligibility criteria described above will be revised and updated, and the consequent changes will be included in a new version of the PoA-DD and new generic CPA-DD validated by a DOE, and shall submit it to the Board for approval in the following events:

- If the applied methodology is revised or replaced by inclusion in a consolidated methodology.
- If the boundary of the PoA is amended post-registration to expand the geographic coverage or to include an additional host Party/ies.
- If the revision of eligibility criteria is requested by the Board at any time during the lifetime of the PoA.
- If an issue related to environment integrity is identified, the revision of eligibility criteria may be requested by the Board at any time during the lifetime of the PoA.

  (a) Once changes have been approved by the Board, the inclusion of all new CPAs shall be based on the updated eligibility criteria applying the new generic CPA- DD;

  (b) If the revision of the eligibility criteria was done because the methodology was put on hold (see bullet 1 above), CPAs that were included before the methodology was put on hold shall apply the revised version of the generic CPA-DD only at the time of the renewal of the crediting period.

- At the renewal of the crediting period of a PoA (at the renewal of the first CPA), the CME shall update the eligibility criteria as per the latest revised applicable methodology and include them in a new version of the PoA-DD and new generic CPA-DD validated by a DOE, and shall be submitted to the Board for approval.

No action will be required if the version of methodology/ies applied by the PoA is revised without being placed on hold or is withdrawn for the purpose of inclusion in a consolidated methodology/ies unless otherwise indicated in the respective report of the meeting of the Board that has approved the new methodology/ies.

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

Demonstration that the proposed PoA is a voluntary coordinated action

As explained in section A.2, the CME will work with other entities, such as *Grupo Financiero de Occidente*, which will finance the development of some projects that will be included in this PoA (although it is not an eligibility criterion to acquire financing through *Grupo Financiero de Occidente*). Therefore, the proposed SSC-PoA will facilitate access to carbon revenues to small hydropower producers, which, in addition to other mechanisms (such as access to investment capital and debt financing, and offered by banking institutions like *Grupo Financiero de Occidente*) will contribute to the

establishment of a feasible project pipeline. These developments will encourage renewable energy electricity generation in the host countries. There are no mandatory laws or regulations in the host countries stipulating to have resort to CDM to develop hydropower facilities. Likewise, no obligation exists for private entities to utilize or develop hydropower projects. The proposed SSC-PoA can be, therefore, regarded as a voluntary coordinated action.

The table below provides a brief timeline of the history of the SSC-PoA and of the 1st SSC-CPA, which are intrinsically associated[11].

Event	Date
October 2, 2009	A cooperation agreement between the parent company of the CME and a banking institution is signed in order to explore the possibility of developing a SSC-PoA.
January 29, 2010	PoA-PIN is developed.
September 16, 2010	Financing for the CDM development of the SSC-PoA is reached via a Financing Agreement between NEOSA and a banking institution.
November 25, 2010	Consultancy Services Agreement for CDM development is signed between NEOSA and South Pole.
May 04, 2011	CDM validation start date (The SSC-PoA-DD, specific SSC-CPA-DD and generic SSC-CPA-DD are uploaded in the UNFCCC website for public comments).
August 25, 2011	Contract between the CME and the owner of the 1st SSC-CPA is signed.

As per paragraph 6e of the Procedures for Registration of a programme of Activities as a Single CDM Project Activity and Issuance of Certifies Emission Reductions for a Programme of Activities, version 4.1 (EB 55, Annex 38), the following information demonstrates that in the absence of the CDM either: (i) the proposed voluntary measure would not be implemented, or (ii) the mandatory policy/regulation would be systematically not enforced and that non-compliance with those requirements is widespread in the country/region, or (iii) that the PoA will lead to a greater level of enforcement of the existing mandatory policy /regulation.

i) The voluntary coordinated action would not be implemented in the absence of the PoA

In the absence of the proposed PoA, the voluntary coordinated actions outlined above would not be likely to be implemented. The study "State of the Region on sustainable human development summary 2008[12]" highlights the fact that despite of the regional efforts to develop policies and strategies to diversify the energy matrix, access to renewable sources and efficient and cheap technologies is still weak. The Energy Statistics Report 2007 from OLADE (Latin American Energy Association) shows that the share of the hydroelectric sector has shown negative or little growth (Table 2).

Country	Share of hydro energy (installed capacity %)	Average (%)

[11] Evidences for the events mentioned in the table have been provided to the DOE.
[12] State of the Region on sustainable human development summary 2008 / Program State of Nation. – San José C.R. : the program, 2008

	1998	2006	2007	1998-2006	2006-2007
El Salvador	42.10	37.41	34.41	-2.22	-8.03
Guatemala	38.29	34.98	36.21	-0.62	3.52

Table 2. Share of hydro energy[13]

Considering the information presented above, it is obvious that in the last decade the participation of fossil fuels in the electricity generation sector has remained as a considerable part of the energy matrix. This pattern suggests strongly that technological know-how and expertise continues oriented towards non-renewable fossil fuel plants.

Additionally, according to the "Analysis of the Renewable Energy Market in El Salvador and Guatemala[14]" the developers of renewable energy projects (particularly small-scale projects) face several investment barriers, mainly due to the high cost of the initial investment compared to the relatively low initial investment cost for non-renewable energy projects (e.g. fuel oil). Moreover, they must comply with the same technological, environmental and legal requirements that larger projects must comply with. In general, these requirements are the same with regard to resources invested for both small and large projects. In the case of small projects, these fixed costs increase the total investment per productive unit (MW) and compromise their feasibility.

By providing investment capital, debt financing, and carbon finance platforms to small renewable power plants, the proposed SSC-PoA will support the sector in overcoming these barriers.

The SSC-PoA is thus deemed additional.

As per paragraph 73 of the 47th EB meeting report "additionality is to be demonstrated either at the PoA level or at CPA level". Hence, additionality will be demonstrated at CPA level, as described in detail in section E.5.2 of this SSC-PoA-DD.

(ii) The mandatory policy/regulation would be systematically not enforced and non-compliance with those requirements would be widespread in the country/region.

Not applicable, the proposed PoA itself is a stated goal that is not required by any mandatory policies/regulations in the host countries.

(iii) The PoA will lead to a greater level of enforcement of the existing mandatory policy /regulation.

Not applicable.

For avoidance of doubt, as outlined above, the CME chooses to demonstrate the additionality at CPA level.

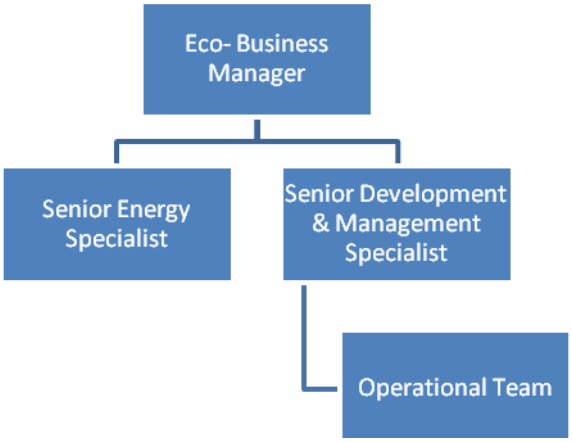
A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

[13] Energy Statistics Report 2007. OLADE. Latin American Energy Association.
[14] "Analysis of the Renewable Energy Market in El Salvador and Guatemala". ARECA Project. 2009.

The proposed SSC-PoA involves a range of operational activities in order to implement and manage each SSC-CPA by the Coordinating and Managing Entity, Neosa, and SSC-CPA owner (or the project implementer) within the Alliance PoA.

The CME organizational chart is provided below.



This organizational diagram is subject to changes depending on the outcomes of the periodic evaluation of the CME operation and management, carried-out as result of its policies on continuous improvements.

In addition, every SSC CPA owner designates a person responsible to be the SSC CPA main contact with the CME. This person will also be responsible of providing the CME with all the needed information to complete the inclusion and verifications processes. This person will support the CME with the monitoring procedures by collecting and providing all the monitoring data, documentation and parameters described in the validated monitoring plan.

The details of the responsibilities of each party are provided in the table below.

Entity	Management Responsibilities and Arrangements
Neosa (the Coordinating and Managing Entity)	• Maintain existing relationship with the project implementers (e.g. conduct training for data monitoring) • Set a framework for the implementation of the PoA and define the CDM programme activity (CPAs) to be included under the PoA • Communicate with UNFCCC (as focal point) • Establish operational and management arrangements for the implementation of the PoA, including a record keeping system for each CPA under the PoA, a system/procedure to avoid double accounting (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) • 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 each Host Party and Annex I Party involved in the PoA • Obtain letters of authorization of its coordination of the PoA from each Host Party • Manage the process of requesting a letter of compliance for the project activity, when it is required by the DNA of the host country. • Submit to the DOE the documents for validation • Forward, after having ensured all the requirements determined in the PoA and its specific CDM-CPA-DD are met, the completed CDM-CPA-DD form to any DOE for consistency checking • Collect (periodically) monitoring data of all CPAs • Prepare monitoring reports for emission reduction verification • Maintain all monitoring reports of all CPAs in accordance with the record-keeping system identified in the CDM-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 modalities of communication as agreed between project participants • Support the developers who wish to participate in the programme by developing their financing models (optional)
Project implementer	• Implement hydropower plant project activity (construction, daily operation, and maintenance of hydropower plant) • Prepare monitoring data

In addition to the above management tasks, Neosa will implement the following operational elements to ensure proper management and oversight of the proposed SSC-PoA.

(i) A record keeping system for each CPA under the PoA

In order to unambiguously identify hydropower plants participating in the SSC-PoA, a serial numbering system will be implemented that uniquely and numerically identifies each hydropower plant for the SSC-CPA and the hydropower facility. This serial numbering system will be used to record baseline and monitoring data on a continuous basis using an Excel database. In this way, the SSC-PoA Coordinating and Managing Entity will be able to track the emission reduction of each hydropower plant over the full duration of the crediting period.

In summary, Neosa will record and document SSC-CPA detail information as follows:

- Name of the SSC-CPA and its installed capacity
- The name, address, and project owner details of each participating SSC-CPA
- The geographical coordinates of each SSC-CPA (GPS coordinates of the powerhouse)
- The record of technical specification of each hydropower plant participating in the SSC-CPA
- The verification status (number of verification and associated monitoring report)

- Emission reductions monitored and issued each monitoring period.

The Coordinating and Managing Entity will be responsible for the management of records and data associated with each SSC-CPA. The Excel database will be updated manually using the data supplied by the participating hydropower plants. It will form the basis for the verification of SSC-CPAs and be available for inspection by the DOE at any point in time.

(ii) A system/procedure to avoid double accounting (e.g. to avoid the case of including a new SSC-CPA that has been already registered either as a CDM project activity or as a CPA of another PoA).

The database described above will be used to perform a double accounting check. Every new SSC-CPA will be compared to the already existing database and the list of project activities that are under validation or registered at the UNFCCC. Moreover, as shown below, the project implementers will be made aware of the double accounting principle and will certify that the proposed SSC-CPA is not registered under the CDM of the UNFCCC or any voluntary scheme. If a SSC-CPA is registered (or under validation) under the CDM or any voluntary scheme, the Coordinating and Managing Entity will not proceed with inclusion of the corresponding SSC- CPA in the proposed SSC-PoA.

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

As per *Guidelines on Assessment of De-bundling for SSC Project Activities* issued version 3 (EB54 annex 13), only hydropower projects with a size greater than 150 kW will perform the de-bundling check. The database described above will be used to perform the de-bundling check. Every new hydropower plant above the 150 kW included as an SSC- CPA will be compared to the already existing database and the list of project activities under validation or registered at the UNFCCC to check whether there is already an activity that satisfies both of the following conditions:

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

Moreover as shown below, the project implementers will be made aware of the de-bundling rules and will certify that the proposed SSC-CPA is not a de-bundled part of a bigger hydropower project. If such a case occurs, the Coordinating and Managing Entity will not proceed with inclusion of the corresponding SSC-CPA in the proposed SSC-PoA.

(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA.

In order to avoid double accounting and to ensure that those operating the SSC-CPA are aware of and have agreed that their activity is being subscribed to the SSC-PoA, the project implementer of a SSC-CPA shall enter into a contractual arrangement with the Coordinating and Managing Entity including respective provisions that:

- The SSC-CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA.
- The project implementer is aware that the SSC-CPA will be subscribed to the present PoA.

- The project implementer is not undertaking (or has not or will not undertake) another hydropower project within one kilometre of the proposed CPA[15].
- An agency contract will be made between Neosa and the hydropower developers, authorizing Neosa for the commercialization of the CERs generated by their projects under the CDM of the UNFCCC or any voluntary scheme to the managing entity of the present SSC-PoA, and authorizing Neosa as focal point in the modalities of communication with the UNFCCC.
- The project implementer certifies that the SSC-CPA is not registered under the CDM of the UNFCCC or any voluntary scheme.

(v) Records of arrangements for training and capacity development for personnel

Training and capacity development activities will be carried out to ensure the CME personnel is qualified to implement the PoA and is familiar with the EB latest guidelines related to PoA development, CPA inclusion, monitoring, verification and issuance.

The training and capacity building activities include seminars, webinars, and other courses carried-out by specialized entities, such as: the World Bank, the Inter-American Development Bank, *Finanzas Carbono*, etc. The frequency of such activities is subject to the outcomes of the periodic evaluation of the CME operation and management, carried-out as result of its policies on continuous improvements.

The CME Staff will be qualified to perform the below activities:

- Eligibility check
- Additionality tests
- Baseline estimations
- Monitoring requirements

The training and capacity development activities will ensure the correct monitoring procedures as established in the CPA-DD, so for this purpose, each CPA implementer will receive specific training adapted to the technical requirements of each CPA according to the installed technology of each power plant.

(vi) Procedures for technical review of inclusion of CPAs

The procedure for technical review for inclusion of CPAs to be carried out to guarantee that the SSC CPA satisfies all the eligibility criteria described in the PoA-DD is described below.

1. Review of Project Documentation: The Senior Energy Specialist with the collaboration of the CPA implementer coordinates the activities in order to get the technical documentation that supports the eligibility criteria for the inclusion of the SSC CPA under the PoA Hydro Alliance.
2. Fill-out of Technical Review Protocol: Using the eligibility criteria under section A.4.2.2, the Senior Energy Specialist will assess with a check mark in an internal archiving system, that each eligibility criterion is satisfied with the documentation provided by the CPA implementer. The Senior Energy Specialist registers the evidence provided and the title of the document used as support.

[15] Only for hydro plants with capacity above the 150kW threshold

3. Send Feedback to Project Owner: Via e-mail the Senior Energy Specialist and the CPA implementer share information and feedback comments in order to determine the positive eligibility of the CPA according to the PoA-DD requirements.
4. Internal Validation of Technical Review Protocol: The Senior Development & Management Specialist double checks the evidence in order to ensure that the projectssatisfies all the eligibility and methodology criteria defined in the PoA-DD.

The procedure mentioned above is a dynamic procedure that might change in the future depending on the outcomes of the periodic evaluation of the CME operation and management, carried-out as result of its policies on continuous improvements.

(vii) Records and documentation control process for each CPA under the PoA

A unique numerical identification control will be implemented for each hydropower plant included in the PoA Hydro Alliance. This will be managed by the Senior Development & Management Specialist using the "Record Keeping Database Control".

This serial numbering system will be used to record baseline and monitoring data on a continuous basis using an Excel database. The CME will be able to track the emission reductions of each hydropower plant over the crediting period.

The "Record Keeping Database Control" will record and document SSC-CPA detailed information as follows:

- Name of the SSC-CPA and its total installed capacity;
- Name, address, and other contact information of the project owner and/or the CPA implementer;
- The geographical coordinates of each SSC-CPA (GPS coordinates of the powerhouse);
- Technical specification of each hydropower plant;
- Verification status (number of verification and associated monitoring report);
- Emission reductions monitored and issued each monitoring period.

The Senior Development & Management Specialist will be responsible for managing and recording data associated to each SSC-CPA. The Excel database will be updated using data supplied by the CPA implementer; which will be the basis for the verification of SSC-CPAs and which will be available for inspection by the DOE at any point in time.

(viii) Measures for continuous improvements of the PoA management system

NEOSA will apply QA/QC based on what is known as best practices for the 2006 IPCCC Guidelines for National Greenhouse Gas Inventories. However, revisions and improvements to the management and operation, based on lessons learnt and industry best practices will be carried out in order to ensure continuous high quality and accuracy in the coordination and management of this PoA.

An evaluation of the monitoring control of the CPA site will also be done in order to identify deviations and/or non-conformities to the monitoring plan, and to take corrective and prevention actions. In a first stage, the the CME will check (along with the responsible personnel at the CPA site), the procedures related to registration and measurements of raw data, as well as recording and documentation measurements. If during this revision the CME identifies a deviation, potential deviation, or a non conformity of the monitoring plan, the CME will communicate the situation by written notification. The SSC CPA owner (or CPA implementer, as applicable), shall implement corrective and preventing actions

in order to correct the situation in a timely manner. If there no errors or non-conformities are observed during the checking process, the CME will inform by written notification that there is no need for further corrections.

A.4.4.2. Monitoring plan:

For each Project Activity under a SSC-CPA, all relevant parameters defined under section E.7.1 will be monitored by the Project Implementer according to the procedures and monitoring framework established in E.7.2. The monitoring data will be submitted to the CME, who will check and finalize the monitoring documentation for verification by the DOE and store the data in a database in such a way that the status of verification can be determined for each SSC-CPA at any time. Each SSC-CPA is to be verified individually.

The CME will submit SSC-CPAs for verification by the DOE pursuant to the sequence described below:

1- The CME will continuously update a list of all SSC-CPAs
2- The CME collects the monitoring information for all SSC-CPAs that will be verified and prepares one monitoring report for each SSC-CPA.
3- Assessment of the SSC-CPAs.
4- The total verified emission reductions by the PoA is computed.

For verification purposes, the CME will follow the procedure described below:

1- Maintenance of a list of verification procedures to be applied to each SSC-CPA

The CME will develop and continuously update a list of SSC-CPAs. This will clearly and uniquely identify each SSC-CPA and gives further important information to build the basis in order to compile a monitoring report, such as the crediting period start date of each SSC-CPA.

2- Collection of monitored parameters and elaboration of the monitoring plan

The monitoring report will compile all required monitoring information for all SSC-CPAs that will be verified by the DOE. This report will unambiguously set out the data on emission reductions generated by each specific SSC-CPA during the monitoring period consistent with the requirements of this SSC-PoA-DD and the corresponding SSC-CPA-DD.

The monitoring plan for parameters included in section E.7.1 will be implemented for each SSC-CPA with assistance from the Coordinating and Managing Entity as follows:

- CPA owner will implement each SSC-CPA individually and monitor and record all parameters included in section E.7.1.
- The Coordinating and Managing Entity will provide guidance to the SSC-CPA owner on how the monitoring should be conducted and data should be collected in regards to emission reductions calculation.
- The SSC-CPA owners will provide data on monitored parameters included in section E.7.1 to the Coordinating and Managing Entity.
- The Coordinating and Managing Entity will document and store all parameters included in section E.7.1 provided by SSC-CPA owners in an electronic database, while primary data will be stored by SSC-CPA owner.
- The Coordinating and Managing Entity review relevant monitoring documents, prepare the

monitoring report, and provide the monitoring report to the DOE.

3- Assessment of the SSC-CPAs

The DOE performs a desk review of the monitoring information of all SSC-CPAs and performs on-site assessments in accordance with the prevailing guidelines and rules.

At the end of the assessment, the CME shall provide an updated monitoring report elaborated in light of the DOE findings.

4-The total verified emission reduction by the PoA is computed

The DOE approves the final monitoring report provided by the CME and certifies that (i) the list and type of data collected and provided within the monitoring report is consistent with the monitoring plan of each SSC-CPA (ii) the ERs are estimated as described in this SSC-PoA-DD and the respective SSC-CPA-DD and are not miscalculated.

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

To date, the CME (Neosa) has not entered into any agreement with international donors. Individual hydropower plants might receive funding by international donors, but the eligibility criteria for inclusion of CPAs ensure that no CPAs that receive funding that constitutes a diversion of official development assistance can enter the programme. Therefore, the Alliance PoA will not receive any public funding.

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

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

04/05/ 2011.

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

28 years

SECTION C. Environmental Analysis

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

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at CPA level ☑

The local impact of each hydropower project—depending on the location, capacity, and type of construction (a dam or other type)—justifies a separate environmental assessment for each SSC-CPA. Environmental analysis will, therefore, be conducted for each hydropower plant included in a SSC-CPA according to the applicable environmental policies at the time of inclusion of SSC-CPA in the SSC-PoA.

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

The environmental impacts analysis will be done at CPA level.

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

Environmental impact assessments will be conducted for each SSC-CPA according to the applicable laws and regulations at the time of inclusion of SSC-CPA to SSC-PoA.

At the time/date this PoA-DD was written, the rules governing Environmental Impact Assessments were laid out in the following documents:

El Salvador:

- General Law of Electricity (*Ley General de Electricidad*), approved by the Congress of the Republic of El Salvador.

Article 13 states that any applicant interested in acquiring a concession for use of the hydro resources must provide a written application to the Telecommunications Superintendence, SIGET, and enclose an Environmental Impact Assessment, among other documents.

Guatemala:

- Decree 68-89, Law of Environmental Protection and Improvement (*Ley de Protección y Mejoramiento del Medio Ambiente)*, approved by the Congress of the Republic of Guatemala.

The Decree specifies in the Article 8 that any project or activity that given its characteristics may impact the natural resources, or the environment, or modify in a notorious and/or negative way the landscape or cultural vestiges, must submit an Environmental Impact Assessment.

- Decree 93-96, approved by the Congress of the Republic of Guatemala on October 16th, 1996.

Article 10 of the Decree refers to the electric generation and transportation and states that hydroelectric projects with an installed capacity greater than 5 MW must apply for a water and land use license.

SECTION D. Stakeholders' comments

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

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at 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 LSC at CPA level.

A LSC at PoA level is not required by any of the DNAs involved in this PoA.

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

The local stakeholder consultation will take place at CPA level.

D.3. Summary of the comments received:

The local stakeholder consultation will take place at CPA level.

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

The local stakeholder consultation will take place at CPA level.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical SSC-CPA. The information defines the PoA-specific elements that shall be included in preparing the PoA- specific form used to define and include a SSC-CPA in this SSC-PoA (PoA specific CDM-SSC-CPA-DD).

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

Name of approved baseline and monitoring methodology:

AMS-I.D.: Grid connected renewable electricity generation --- Version 17 (I.D./Version 17, Sectoral Scope: 01, EB 54).

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

The applicability criteria of AMS I.D. v17 are the following:	Methodology AMS I.D. v17 is applicable to an SSC-CPA under the proposed SSC-PoA because:
This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:[16] (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	As per eligibility criteria 1 and 11, a SSC-CPA will consist of a hydroelectric plant that supplies electricity to a grid within the host countries.

[16] Refer to EB 23, annex 18 or the definition of renewable biomass.

This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition[17]; (c) involve a retrofit[18] of (an) existing plant(s); or (d) involve a replacement[19] of (an) existing plant(s).	As per eligibility criterion 10, the SSC-CPA shall be a project activity that will: (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).
Hydropower plants with reservoirs[20] that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir,[21] where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	As per eligibility criterion 12, a SSC-CPA that comprises a reservoir shall have a power density greater than 10 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[22] the capacity of the entire unit shall not exceed the limit of 15MW.	As per eligibility criterion 13, the total installed capacity of each SSC-CPA must not be greater than 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable because as per eligibility criterion 3, the proposed SSC-PoA does not include combined heat and power systems.

[17] A capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) The installation of a new power plant besides the existing power plant/units; or (ii) The installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity.

[18] Retrofit (or rehabilitation or refurbishment). It involves an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

[19] Replacement. It involves investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The installed capacity of the new plant or unit is equal to or higher than the plant or unit that was replaced.

[20] A reservoir is a water body created in valleys to store water generally made by the construction of a dam.

[21] A reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity.

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

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[23] from the existing units.	As per eligibility criteria 13 and 19, the total installed capacity must not exceed 15 MW, and the operation of the added units must not interfere with the operation of the existing units; therefore, must be "physically distinct".
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	As per eligibility criterion 13 the total installed capacity must not exceed 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 as per eligibility criterion 3.
In the specific case of biomass project activities the determination of leakage shall be done following the general guidance for leakage in small-scale biomass project activities (attachment C of appendix B of simplified modalities and procedures for small-scale clean development mechanism project activities; decision 4/CMP.1) or following the procedures included in the leakage section of AM0042.	Not applicable as per eligibility criterion 3.
In case the project activity involves the replacement of equipment, and the leakage from the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.	As per eligibility criterion 18.

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

As per AMS I.D. v17, "the project boundary encompasses the physical, geographical site of the renewable generation source delineates the project boundary". The project boundary encompasses the

[23] 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".

hydropower project site from the water intake to the substation or interconnection point where the electricity is delivered to the grid, and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The project boundary is visualized in the figure below:

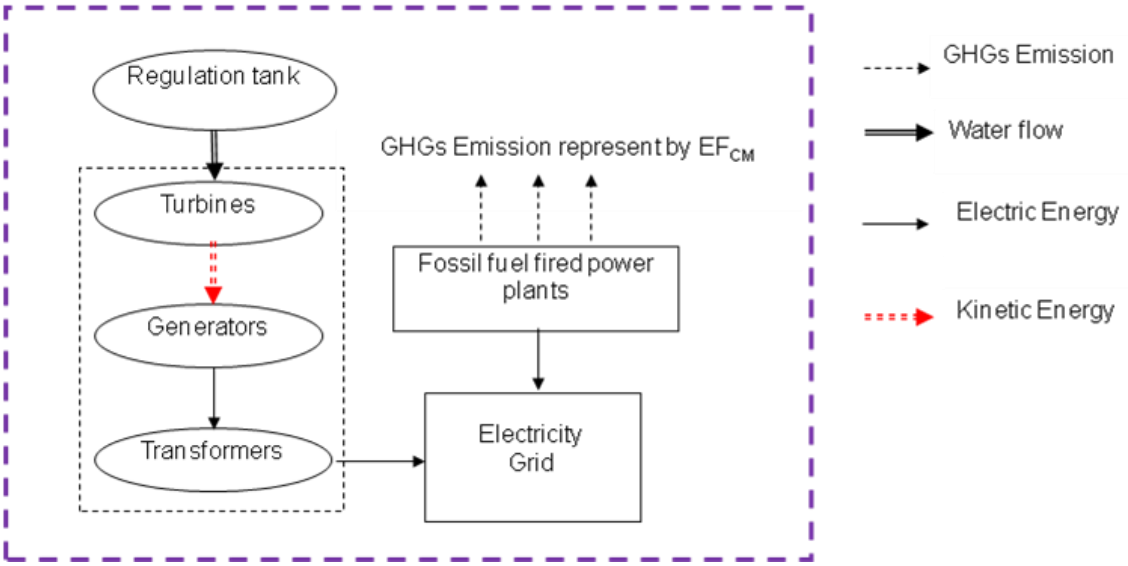


Figure 3. Project boundary

The GHG and emission sources included in or excluded from the project boundary are shown in the table below.

	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emission from electricity generation in fossil-fuel-fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	Emissions of CH_4 from the reservoir.	CO_2	No	Minor emission source if the project does not comprise a fossil fuel engine. Main emission source if the project does comprise a fossil fuel engine.
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

Table 3. Emissions sources included in or excluded from the project boundary

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

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 in the SSC-CPA host country and by the addition of new generation sources. The baseline scenario is, therefore, in line with all laws and regulations of the host countries.

According to AMS I.D. 17 paragraph 11, the baseline emissions are calculated as the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$$BE_y = EG_{BL,y} \bullet EF_{CO2}$$

Where:

$BE_{,y}$	Baseline Emissions in year *y*; t CO_2
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y*; MWh
EF_{CO2}	CO_2 Emission Factor in year y; t CO_2e/MWh

According to AMS I.D. 17 paragraph 12, the emission factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"; or
(b) The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

For all SSC-CPAs under this SSC-PoA option (a) will be used for calculating the baseline. The details of this calculation are provided in section E.6.1 of this SSC-PoA-DD.

For SSC-CPAs that involve retrofits or replacements of an existing facility the baseline scenario is the continuing operation of the existing plant, assuming that the historical situation observed prior to the implementation of the project activity would continue. In the absence of the project activity, the existing facility would continue to provide electricity to the grid $EG_{BL,retrofit,y}$ at historical average levels $EG_{historical}$until the time at which the electrical generation facility would be likely to be replaced or retrofitted in the absence of the project activity ($DATE_{BaselineRretrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity supply is assumed to equal the project's net electricity supply and no emission reductions are assumed to occur.

In the specific case of retrofit/capacity addition where power generation can vary significantly from year to year, due to natural variations in the availability of the renewable source, the use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed

during the historical period rather than the effects of the project activity. The baseline emissions ($BE_{retrofit,CO_2,y}$) are thus calculated as follows:

$$BE_{retrofit,CO2,y} = [EG_{BL,retrofit,y}] * \mathrm{EF}_{\mathrm{CO2}}$$

Where:

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

$$EG_{BL,retrofit,y} = 0 \; on/after \; DATE_{Baseline\mathrm{Retrofit}}$$

Where:

$EG_{BL,retrofit,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$\mathrm{EG}_{\mathrm{PJ,facility,y}}$	Quantity of net electricity supplied to the grid by the project plant/unit in year *y* (MWh)
$\mathrm{EG}_{\mathrm{historical}}$	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 $\mathrm{EG}_{\mathrm{historical}}$, 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): a) The three last calendar years (five calendar years for hydro project) prior to implementation of the project activity; or b) The time period from the calendar year following DATEhist, 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 DATEhist is latest point in time between: (i) The commercial commissioning of the plant/unit; (ii) If applicable: the last capacity addition to the plant/unit; or (iii) If applicable: the last retrofit of the plant/unit
$\sigma_{\mathrm{historical}}$	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)
$DATE_{Baseline\mathrm{Retrofit}}$	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

Project activities for capacity addition in hydro shall use equation $EG_{BL,retrofit,y} = \mathrm{EG}_{\mathrm{PJ,facility,y}} - (\mathrm{EG}_{\mathrm{historical}} + \sigma_{\mathrm{historical}})$ replacing subscript 'retrofit' with 'capacity addition', where $\mathrm{EG}_{\mathrm{PJ,y}} = \mathrm{EG}_{\mathrm{PJ_Add}}$

Where:

$EG_{PJ,y}$	Quantity of net generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$\mathrm{EG}_{\mathrm{PJ_Add},y}$	Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity (MWh)

Thus:

$$BE_{Add,CO2,y} = [EG_{BL,Add,y}] * \mathrm{EF}_{\mathrm{CO2}}$$

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

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

The following additionality tests will be followed. If SSC-CPA meeting Test a qualification, Test b must not be performed accordingly.

Test a: Additionality is demonstrated pursuing EB68, Annex 26, paragraph 2.

Projects with an up to 5 MW of installed capacity and located in a special underdeveloped zone of the host country are automatically additional.

Test b: Additionality is demonstrated in accordance with the Guidelines on the demonstration of Additionality of Small-Scale Project Activities, version 09[24] pursuing an investment analysis.

As each hydropower project generates financial benefits other than CDM-related income, the benchmark analysis will be used to demonstrate additionality. For all the projects that do not fulfill the characteristics described in test a above, the project IRR must be lower than a benchmark in order to be deemed additional.

To be additional, each SSC-CPA will have to pass one of these two tests. The procedure for conducting the tests at SSC-CPA level is described in detail in section E.5.2.

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

Test a: Is the installed capacity of the CPA below or equal to 5 MW, and is the SSC-CPA located in a special underdeveloped zone of any of the host countries?

This additionality test is based on annex 26 of EB68[25] according to which renewable energy projects are

[24] EB 68 Annex 27

deemed additional if their total installed capacity is below or equal to 5 MW and are located in a special underdeveloped zone of the host country.

For this test, the size of the renewable project is chosen as per the generator installed capacity. The definition of the special underdeveloped zone will be considered as per paragraph 2.a i) of the "Guidelines for demonstrating additionality of microscale project activities (version 4)". The location of the CPA will be determined as the location of the powerhouse.

Test	Yes	No
CPA total installed capacity is below or equal to 5MW.		
CPA is undertaken in a country or municipality considered a special underdeveloped zone (SUZ). SUZ is a region in the host country (zone, municipality or any other designated official administrative unit) identified by the Government in official notifications for development assistance including for planning, management, and investment satisfying any one of the following conditions using most recent available data: • the proportion of population with income less than 2 USD per day (purchasing power parity) is greater than 50%, or • the GNI per capita in the country is less than USD 3000[26] and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures[27]		

Test b: Investment analysis

For qualifying SSC-CPAs that do not meet Test a described above, an investment analysis will be performed pursuant to Step 2 of the **"**Tool for the demonstration and assessment of additionality" (version 6.0.0). As each hydropower project generates financial benefits other than CDM-related income, the benchmark analysis will be used to demonstrate additionality.

Since the alternative to the SSC-CPA is the supply of electricity from a grid, and given that this alternative does not require investment and is outside the direct control of the project developer, it is appropriate to compare the financial viability of the development and operation of each SSC-CPA with a scenario where the CPA owner does not undertake the project ("non-action") and deploys the financial resources that would have been used to finance the construction of the project for alternative investments. To this end, the project IRR (without CDM revenues) will be compared with a benchmark rate for investment returns available to a local investor in the host country. This benchmark represents the minimum project IRR that is required for the project to be financially viable relative to the "non-action" scenario.

For this PoA, the 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 Guidelines on

[25] "Guidelines for demonstrating additionality of microscale project activities" (Version 04)
[26] PPP or the World Bank atlas method or another comparable method.
[27] Information on per capita income or other economic indicators used for the ranking purposes shall be provided in USD.

the Assessment of Investment Analysis (version 5, Para 11), the investment analysis uses project IRR and benchmark pre- or post-tax[28].

Benchmark calculation

Hydropower projects in Central America are financed using a combination of loan and equity financing, so the appropriate benchmark rate of return is determined as the Weighted Average Cost of Capital (WACC)[29]. It is defined as the average financial return expected across the different types of capital that finance a given project. Individual CPAs are free to use other benchmark approaches such as Prime Lending Rate or any other internal company specific benchmark. However, all benchmarks shall be determined as per investment decision date of the SSC-CPA.

For the purpose of this PoA the WACC may be determined for each SSC-CPA by using the following rules:

- All financial information used for the benchmark determination will be sourced from independently verifiable sources

- The cost of equity may be determined using the capital asset pricing model (CAPM).

The WACC will be calculated as follows:[30]

$$WACC = CD \times \%Debt + CE \times \%Equity$$

Depending on whether the comparison is to be done on a Post Tax or Pre Tax basis, the WACC may be determined as follows:

$$WACC(post-tax) = CD \times (1-T) \times \%Debt + CE \times \%Equity$$

The cost of equity may be determined for instance based on the capital asset pricing model[31] (CAPM):

$$CE = RFR + \beta \cdot (RP)$$

Where:

$$\beta = \beta unlevered \times (1 + (1-T) \times D/E)$$

The WACC (pre-tax) can in turn be determined by [32]:

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[28] If the investment analysis uses pre-tax project IRR, then it will have to be compared with a pre-tax benchmark; if the investment analysis uses post-tax project IRR, then it will have to be compared with a post-tax benchmark.
[29] As per paragraph 12 of the Guidance on the Assessment of Investment Analysis (version 5)
[30] Velez-Pareja, Ignacio and Tham, Joseph, "A Note on the Weighted Average Cost of Capital WACC" (August 7, 2005). Available at SSRN: http://ssrn.com/abstract=254587. Tax is excluded from the standard WACC formula to establish a pre-tax benchmark.
[31] Black, Fischer., Michael C. Jensen, and Myron Scholes (1972). The Capital Asset Pricing Model: Some Empirical Tests, pp. 79-121 in M. Jensen ed., Studies in the Theory of Capital Markets. New York: Praeger Publishers.

$$WACC(pre-tax) = WACC(post-tax)/(1-T)$$

Where:

Parameters	Description	Source and explanation
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond is considered as risk free instrument. Bond rate is taken as the 3 month average prior to the investment decision and for a duration equal to the technical lifetime of the project activity Source: http://www.treasury.gov
ß *unlevered*	Beta (unlevered)	Total Beta (*Unlevered*) from Damadoran (Stern University) for the relevant industrial sector; most recent before the investment decision was made. It reflects a firm's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of businesses. http://pages.stern.nyu.edu/~adamodar/ "Total Beta by industry sector"
RP	Total Risk Premium	The Total Risk Premium includes an Equity Risk Premium and a Country Risk Premium. The reason behind this premium stems from the risk-return trade off, in which a higher rate of return is required to entice investors to take on riskier investments. http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"
CD	Cost of Debt	The cost of debt can be assumed as the commercial lending rate in the host country or the yield of a 10 year bond issued by the government of the host country or, if this is not available, the bond with the maturity which is closest to 10 years. - EB62Annex 5, Para 16.) if a company's internal benchmark is used. If the WACC is based on parameters that are standard in the market, the cost of debt can be taken as the cost of financing in the capital markets, eg the host country commercial lending rate in the host country as per EB62 Annex 5, Para 16)
%Debt	% of finance from debt	As per EB 62, Annex 5, Para 17, 18
%Equity	% of finance from equity	As per EB 62, Annex 5, Para 17, 18
CE	Cost of Equity, ie	Calculated as per CAPM or any other applicable method

[32] While calculating a pre-tax WACC benchmark from a post-tax WACC benchmark, the tax should not be set to zero in the calculation itself. Rather the whole WACC equation needs to be divided through (1-tax rate) to reflect the actual pre-tax benchmark.

	Average expected return on equity	
T	Tax rate	

Table 4. Key parameters for calculation of benchmark

If over the course of the lifetime of the PoA, a parameter or the source of its value becomes unavailable or is replaced by a more relevant parameter and/or source, then this parameter and/or sources will be revised accordingly prior to acceptance from the DOE.

Sensitivity analysis

A sensitivity analysis will be conducted using assumptions that are conservative from the point of view of analysing additionality, i.e. the best-case conditions for the project IRR are assumed by altering some parameters by +/- 10%: (such as project revenues, total investment and O&M expenditure, among others).

Please notice that only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude).

The full results of each sensitivity analysis will be reported in the respective SSC-CPA-DD using the following format:

	IRR
Parameter 1 (Specify variation)	
Parameter 2 (Specify variation)	
Parameter 3 (Specify variation)	

Table 5. Framework for reporting results of sensitivity analysis

Project IRR calculation

Project IRR calculations will be based on a list of economic parameters provided by the CPA owner that were available at the investment decision. This list of parameters includes:

	Unit	Comment
Technical lifetime	Year	As per manufacturer specification or as per expert's opinion.
Investment decision date	DD/MM/YYYY	
Construction start year	Year	
Year in which project starts operating	Year	
Annual electricity generation	MWh/year	As per guidelines for the reporting and validation of plant load factors (version 1). Value is given at delivery point. In the case of capacity addition projects, only the electricity generated by the new units will be

		included in the calculation. In the case of retrofit projects, only the annual electricity generation from the point in time when the existing equipment would need to be replaced in the absence of the project activity onwards will be considered in this calculation.
FINANCIAL PARAMETERS		
	Unit	**Comment**
Electricity tariff	Local currency/kWh	As per legislation of the host country at date of investment or as per PPA if signed at date of investment. The tariff will be indexed to inflation only if specified in the PPA or relevant policy.
Increase in electricity tariff	% per year	
Inflation	% per year	If not otherwise specified as per inflation rate during the month when the investment decision was made.
Exchange rate	Foreign/local currency	If some costs/revenues are provided in foreign currency the exchange rate as per date of investment decision shall be used to convert them into local currency.
COSTS AND EQUIPMENT		
	Unit	**Comment**
Total investments	USD	If the construction is expected to last several years, a yearly breakdown of investments can be provided.
Other revenues	USD	To be included in the calculation only if applicable to the SSC-CPA.
Operation & Maintenance cost	USD/year	If no specified otherwise, O&M will be indexed using the consumer price index.
Other operating expenditure	USD/year	To be included in the calculation only if applicable to the SSC-CPA.
Insurance	% of Capex p.a.	

Table 6. Key parameters for calculation of project IRR

The parameters listed in Table above shall be obtained from documents provided by the CPA owner to financers or government agencies. Dates at which these documents were compiled will also be reported in the SSC-CPA-DD. 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 will be inflated accordingly using the host country inflation index.

If the IRR in the sensitivity analysis exceeds the benchmark in one or more of the three scenarios considered for the sensitivity analysis, the CME shall provide evidence that this scenario is unlikely to occur. If no sufficient proof is provided, the CPA will be considered non-additional. Otherwise the CPA shall be deemed additional.

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

E.6.1. Explanation of methodological choices, provided in the approved baseline and

monitoring methodology applied, selected for a typical SSC-CPA:

The SSC-CPA consists of a grid connected hydropower generation plant.

Baseline emissions:

The baseline emissions are the product of electrical energy baseline expressed in MWh of electricity produced by the hydropower generating unit multiplied by the grid emission factor. Details about calculation of grid emission factor are provided in this section below.

Project emissions:

As per paragraph 20 of AMS I.D v17, for most renewable energy project activities, PEy = 0. However, for emissions from water reservoirs of hydro power plants, project emissions have to be considered following the procedure described in the most recent version of ACM0002[33].

Paragraph 21 of AMS I.D v17 states also that "CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

Details of the calculation of Project Emissions are provided in section E.6.2 of the SSC-PoA-DD.

Leakage:

Methodology AMS I.D v17 states that "if the energy generating equipment is transferred from another activity, leakage is to be considered".

As per eligibility criterion 18, leakage related to the replacement of equipment shall be zero: $LE_y = 0$.

Grid emission factor estimation:

As an International SSC-PoA, the SSC-CPAs will not be necessarily connected to the same grid. Accordingly, only emission factors of the host countries (and provided here in the PoA-DD) will be considered in the emission reduction estimation, and the values will be fixed during the first crediting period.

As per paragraph 12 of AMS I.D. v17 the emission factor can be calculated as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the Emission Factor for an electricity system' version 2.2.1.

OR

(b) 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.

[33] ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 12.3.0.

For all SSC-CPAs under this SSC-PoA option (a) will be used for calculating the baseline.

$EFCO_2$ will be calculated as the Combined Margin (CM) emission factor determined using the 'Tool to calculate the Emission Factor for an electricity system' version 2.2.1 as following:

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

Step 1. Identify the relevant electricity systems

According to the "Tool to calculate the emission factor for an electricity system" (version 2.2.1), a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to a project activity (in this case, to a SSC-CPA) and that can be dispatched without significant transmission constraints. Correspondingly, in this Programme of Activities the electricity system includes the SSC-CPA site and all power plants attached to grid as defined by the Administration of the Wholesale Market in Guatemala (AMM, by its acronym in Spanish, http://www.amm.org.gt) and by the General Electricity and Telecommunications Superintendence (SIGET, by its acronym in Spanish; http://www.siget.gob.sv) in El Salvador.

In both countries, the electricity system is nation-wide and includes imports and exports. The detail of the individual systems covered by each grid is shown under step 3 below.

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

According to the latest version of the tool, project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

For the proposed SSC-PoA, project participants choose to apply Option I, which only power plants connected to the grids (as defined by the AMM and the SIGET, respectively) are included in the calculation.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$= EF_{CO2}) is based on one of the following methods:

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

For the estimation of both grid emission factors, the simple adjusted OM method (option b) is chosen and can be used because, as shown in figures below, low-cost/must-run resources constitute more than 50%

(based on an average of the five most recent years for which information is available) of total grid generation.

Selection how to calculate the operating margin of each grid defined by the Wholesale Market in Guatemala, by the General Electricity and by the Telecommunications Superintendence in El Salvador as applied in the ex-ante calculation will be based on public available documentation.

Relevant electricity system in Guatemala and the share of Low-Cost/Must-Run plants in the last five years

	Fuel	Operation year	Installed capacity (MW)	TOTAL 2006 GWH	TOTAL 2007 GWH	TOTAL 2008 GWH	TOTAL 2009 GWH	TOTAL 2010 GWH
Hydroelectric plants								
CHIXOY	N / A	1983	300.00	1647.242	1406.223	1734.780	1417.946	1691.832
AGUACAPA	N / A	1982	90.00	299.930	267.772	308.200	244.573	317.023
JURUN	N / A	1970	60.00	251.798	241.564	268.660	191.403	276.289
ESCLAVOS	N / A	1966	15.00	63.425	58.927	63.090	49.136	44.337
RIO BOBOS	N / A	1995	10.00	58.043	59.314	66.710	47.032	52.018
SECACAO	N / A	1998	16.50	112.114	102.163	91.990	94.073	94.400
PASABIEN	N / A	2000	12.75	63.425	56.781	64.763	40.793	53.805
POZA VERDE	N / A	2005	12.5	45.87	42.70	45.611	31.191	35.213
LAS VACAS	N / A	2002	45.70	99.775	87.745	99.631	77.648	42.324
EL CANADÁ	N / A	Nov 2003	48.10	162.889	174.737	214.677	178.002	233.372
MATANZAS + SAN ISIDRO (FROM TECNOG	N / A	2002	15.93	42.267	58.651	71.111	61.349	63.734
RENACE	N / A	2004	68.1	320.52	288.70	318.677	215.533	310.536
PALIN II	N / A	2005	5.8	9.86	0.98	0.000	0.000	0.000
MONTECRISTO	N / A	2006	13.5	3.40	40.56	57.465	47.432	57.306
CANDELARIA	N / A	2006	4.60	17.806	25.414	24.738	23.137	23.708
EL RECREO (FROM HIDROTAMA)	N / A	2008	26.0		16.79	130.431	113.324	140.819
HIDROXACBAL	N / A	2010	94.00			0.000	0.000	259.556
PANAN	N / A	2010	3.90			0.000	0.000	0.034
SMALL HYDROS*	N / A	See below:		47.103	56.570	56.126	56.918	55.620
* INCLUDES GENERATION FROM: EL SALTO, PORVENIR, CHICHAIC, SANTA MARÍA, SAN JERÓNIMO, CERRO VIVO.								
Santa Maria		1926	6.00					
El Salto		1938	2.00					
Porvenir		1968	2.28					
Chichaic		1979	0.60					
San Jeronimo		1996	0.25					
Cerro Vivo		2001	1.50					
Thermal Plants								
Steam turbines								
SAN JOSE	Bituminous Coal	2000	139.0	1010.47	1037.52	1016.630	588.717	942.539
LA LIBERTAD	Bituminous Coal	2008	20.0	0.00	0.00	30.930	47.307	41.857
ARIZONA VAPOR 1	Bunker	2008	12.5	0.00	0.00	10.570	17.443	7.797
Geothermal								
ORZUNIL	N / A	1999	20.00	121.76	143.23	135.490	125.844	114.429
CALDERAS	N / A	N/A	4.20	20.77	0.000	0.000	0.000	0.000
ORTITLAN	N / A	2007	24.00	0.00	89.665	136.160	154.095	144.879
SUGAR MILLS								
CONCEPCION	Biomass / Bunker	1994	27.50	107.89	158.76	107.67	110.67	68.54
PANTALEON	Biomass / Bunker	1991	35.00	185.87	216.42	167.50	189.48	181.03
PANTALEON EXCEDENTES	Biomass	2005	20.00					
SANTA ANA	Biomass / Bunker	1995	40.00	106.89	144.42	137.76	157.56	122.51
MAGDALENA	Biomass / Bunker	1994	90.00	160.19	149.13	178.92	315.42	316.56
MAGDALENA EXCEDENTTES	Biomass	2005-2006	41.00					
LA UNION	Biomass / Bunker	1995	40.00	119.07	141.86	122.29	148.88	151.40
LA UNION EXCEDENTES	Biomass	2009	10.00					
MADRE TIERRA	Biomass / Bunker	1996	28.00	73.06	80.55	83.36	84.93	87.93
TULULA	Biomass / Bunker	2001	19.0	34.82	38.23	29.90	28.86	11.26
SAN DIEGO	Biomass	2004	5.00	0.00	0.00	3.62	3.18	1.39
TRINIDAD	Biomass	2009	26.00	0.00	0.00	33.97	29.77	38.30
DARSA	???	2004	8.50	3.06	3.98	0.01	0.00	0.00
INTERNAL COMBUSTION								
ARIZONA	Bunker	2003	160.0	847.47	954.95	748.610	1023.810	643.014
LA ESPERANZA (Poliwatt)	Bunker	2000	129.4	476.74	595.47	532.690	704.304	454.749
PQPLLC (Puerto Quetzal Power)	Bunker	1993	118.00	77.76	204.65	107.28	244.189	40.223
LAS PALMAS 1	Bunker	1998	66.80	88.40	71.94	30.00	73.039	63.995
LAS PALMAS 2	Bunker			72.50	76.53	56.09	75.697	67.843
LAS PALMAS 3	Bunker			75.12	97.01	54.75	69.688	41.134
LAS PALMAS 4	Bunker			69.40	81.62	56.54	78.774	24.723
LAS PALMAS 5	Bunker			15.50	28.97	15.73	28.744	14.286

GENOR	Bunker	1998	46.24	178.23	191.69	192.34	208.366	215.690
SIDEGUA	Bunker	1996	44.00	74.64	70.94	41.05	56.265	22.692
Amatex/ Lagotex / TEXTILES B1 *	Bunker	1996	71.00	99.09	80.43	32.92	70.061	23.400
Amatex/ Lagotex / TEXTILES B2 *	Bunker	1996		25.86	53.47	48.06	77.504	63.967
Amatex/ Lagotex / TEXTILES B3 *	Bunker	1996				2.98	19.074	42.800
ELECTROGENERACIÓN	Bunker	2003	15.8	68.56	60.75	21.710	42.998	32.383
GENERADORA PROGRESO	Bunker	1993	21.97	50.40	66.28	48.500	69.171	27.108
GECSA	Bunker	2007	15.7		66.05	92.270	35.036	8.906
GECSA2	Bunker	2008	37.8	0.00	0.00	1.070	54.722	12.443
COENESA	Diesel	2008	10.0	0.00	0.00	0.100	0.082	0.057
ELECTROCRISTAL BUNKER	Bunker	2005	10.0	0.00	0.00	0.000	26.882	10.196
Gas Turbines								
TAMPA	Diesel	1995	80	6.488	12.46430135	11.290	25.990	2.026
STEWART & STEVENSON	Diesel	1995	51	0.966	1.540304253	1.500	3.111	0.844
ESC.GAS No. 3	Diesel	1976	35	0.000	0.000	0.000	1.888	0.120
ESC.GAS No. 5	Diesel	1985	41.85	1.006	1.325149616	0.790	1.482	0.155
LAGUNA GAS 1	Diesel	1978	17	0.000	0.755	0.290	0.944	0.226
LAGUNA GAS 2	Diesel	1978	26	0.00	0.32	0.160	0.000	0.000
Distributed generation (hydroplants)								
SANTA ELENA	N / A	2008	0.70	0.00	0.00	0.009	2.030	0.768
KAPLAN CHAPINA	N / A	2009	2.00	0.00	0.00	0.000	0.432	0.569
CUEVAMARIA	N / A	2009	1.50	0.00	0.00	0.000	2.612	8.703
LOS CERROS	N / A	2010	1.25	0.00	0.00	0.000	0.000	2.794
COVADONGA	N / A	2010	1.60	0.00	0.00	0.000	0.000	1.268
JESBON MARAVILLAS	N / A	2010	0.75	0.00	0.00	0.000	0.000	0.950
EL PRADO	N / A	2010	0.50	0.00	0.00	0.000	0.000	0.055
OSCANA	N / A	2010	0.44	0.00	0.00	0.000	0.000	0.005

Imports (-)				1.920	3.513	0.875	32.405	354.062
Exports (+)				81.783	127.414	64.639	84.817	134.522
Net				79.863	123.901	63.764	52.412	-219.540

Notes:
* From 2005 to 2008 AMM names "Textiles B1", "Textiles B2" and "Textiles B3" as "Amatex", "Lagotex" and "Amatex Bloque 3". Such plants belong to "Generadora del Este" which total

Total energy generation	7,417.44	7,906.51	7,908.16	7,888.55	7,810.44
Non low-cost/must-run	3,274.17	3,796.67	3,193.774	3,693.376	2,849.222
Low-cost/must run	4,143.26	4,109.84	4,714.38	4,195.17	4,961.22
	55.86%	**51.98%**	**59.61%**	**53.18%**	**63.52%**

Total installed capacity: **2,471**

Sources:

Generation per plant per year:
Administration of the Wholesale Market. Executed Load Dispatch from the Interconnected National System, 2008, 2009, 2010
http://www.amm.org.gt/

Installed capacity and type of fuel consumed:
Installed capacity in the National Electric System
www.amm.org.gt/pdfs/capacidad_instalada.pdf

Sugar mills data:
Guatemalan Centre of Research and Capacity Building on Sugar Reed, Cengicana.
http://www.cengicana.org
Statistics Report, Year 10, No.2, November 2009.

Relevant electricity system in El Salvador and the share of Low-Cost/Must-Run plants in the last five years

Power plant	Fuel [2]	Operation year [1]	Installed capacity (MW) [1]	TOTAL 2006 MWH [1]	TOTAL 2007 MWH [1]	TOTAL 2008 MWH [1]	TOTAL 2009 MWH [1]	TOTAL 2010 MWH [1]
Hydrolectric plants								
Guajoyo		1963	19.8	86,936	81,104	100,289	51,234	84,794.6
Cerrón Grande		1977	172.8	653,487	483,684	627,746	400,992	723,652.9
5 de noviembre		1954	99.4	547,857	526,890	549,982	474,060	529,377.2
15 de septiembre		1983	180	668,991	642,514	755,360	574,098	741,155.5
Geothermal plants								
Ahuachapan		1975	95	629,571	607,892	668,573	665,426	649,818
Berlin		1992	109.4	440,009	685,146	752,367	755,434	777,640
Thermal plants								
Acajutla	Bunker	before 1965	322.1	1,031,288	895,331	752,451	709,270	532,873
Soyapango	Bunker	1972	16.2	48,891	49,147	57,791	36,353	24,420
Nejapa Power	Bunker	1995	144	807,805	696,393	521,133	527,547	406,571
Planta el Rronco/Cementera de el Salvador	Bunker	2001	32.6	177,430	87,661	191,908	172,414	117,022
Inversiones energéticas	Bunker	2006	100.2	14,277	351,011	312,903	602,550	590,232
Textufil	Bunker	2006	44.1	216,173	216,123	181,975	216,398	201,010
Gecsa	Bunker	2007	11.6		4,064	57,384	68,105	56,547
Energía Borelais	Bunker	2007	13.6		73,523	74,264	69,490	54,973
Hilacsa Energy	Bunker	2008	6.8			13,887	47,191	38,055
Sugar mills [3]								
Compañía azucarera Salvadoreña, S.A. de C.V.	Biomass	2003	50	92,011	90,397	98,234	95,999	109,381
Ingenio El Ángel	Biomass	2008	22.5			4,800	32,582	42,814
Ingenio la Cabaña	Biomass	2008	21			3,302	14,413	27,461
			Imports (-)	11,077	38,371	83,000	208,369	174,198
			Exports (+)	8,641	6,718	89,000	78,677	88,981
			Net	2,436	31,653	(6,000)	129,692	85,217

Total	5,425,801	5,529,247	5,807,348	5,721,924	5,881,993
Total non- LCMR	2,295,864	2,373,251	2,163,695	2,449,317	2,021,701
Total LCMR	**3,129,937**	**3,155,996**	**3,643,653**	**3,272,607**	**3,860,292**
	57.69%	**57.08%**	**62.74%**	**57.19%**	**65.63%**

Sources:

1. Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET Electric_Statistics_Bulletin_12_2010.pdf refer to tables 1 and 10
SIGET. http://www.siget.gob.sv
Home --> Temas --> Electricidad --> Documentos --> Estadísticas
2. Type of Fuel Report. Transaction Unit, http://www.ut.com.sv

Assumes:

3. As per option A.3 of the 'Tool to calculate the emission factor for an electricity system' (Version 2.2.1), the emission factor of sugar mills will be considered zero ("**Option A.3:** If for a power unit m only data on electricity generation is available, an emission factor of zero (0) tCO2/MWh can be assuemd as a simple and conservative approach.)

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

Calculation of the operating margin in the proposed SSC-PoA for the Guatemalan and Salvadorian grids are calculated as the ex-ante with a three-year-generation-weighted average CO_2 emissions per unit of net electricity generation (tCO_2/MWh) of all generating power plants serving the system, including low-cost/must-run power plants/units. These estimations will follow the Simple adjusted OM calculation method.

The Simple adjusted OM emission factor is a variation of the Simple OM emission factor, where the power plants/units (including imports) are separated in low-cost/must-run power sources (*k*) and other power sources (*m*). As under Option A of the simple OM, it is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OM\text{-}adj,y} = (1-\lambda_y)\cdot\frac{\sum_m EG_{m,y}\times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y\cdot\frac{\sum_k EG_{k,y}\times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

Where:

$EF_{grid,OM\text{-}adj,y}$	Simple adjusted operating margin CO_2 emission factor in year (tCO_2/MWh)
$\lambda_{,y}$	Factor expressing the percentage of time when low-cost/must-run power units are on margin in year *y*
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EG_{k,y}$	Net quantity of electricity generated and delivered to the grid by power unit *k* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{EL,k,y}$	CO_2 emission factor of power unit *k* in year *y* (tCO_2/MWh)
m	All grid power units serving the grid in year *y* except low-cost/must-run power units
k	All low-cost/must-run grid power units serving the grid in year *y*
y	The relevant year as per the vintage data chosen

$EG_{m,y}$, $EG_{k,y}$, $EF_{EL,m,y}$ and $EF_{EL,k,y}$ should be determined using the same procedures as those for the parameters $EF_{EL,m,y}$ and $EG_{m,y}$ in Option A of the simple OM method.

The parameter $\lambda_{,y}$ is defined as follows:

$$\lambda_y\,(\%) = \frac{\text{Number of hours low - cost / must - run sources are on the margin in year y}}{\text{8760 hours per year}}$$

Lambda λ_y is calculated following the next steps:

1. Plot a lot a load duration curve. Collect chronological load data (typically in MW) for each hour of the year y, and sort the load data from the highest to the lowest MW level. Plot MW against 8760 hours in the year, in descending order. Please notice that because 2008 was leap year, calculations are based on 8,784 hours instead of 8,760.

2. Collect electricity generation data from each power plant/unit. Calculate the total annual generation (in MWh) from low-cost/must-run power plants/units (i.e. Σ k $EG_{k,y}$).

3. Fill the load duration curve. Plot a horizontal line across the load duration curve such that the area under the curve (MW times hours) equals the total generation (in MWh) from low-cost/must-run power plants/units (i.e. Σ_k $EG_{k,y}$).

4. Determine the number of hours for which low-cost/must-run sources are on the margin in year *y*. First, locate the intersection of the horizontal line plotted in Step 3 and the load duration curve plotted in step 1. The number of hours (out of the total of 8,784 hours for 2008 and 8,760 hours

for 2009 and 2010) to the right of the intersection is the number of hours for which low-cost/must-run sources are on the margin. If the lines do not intersect, then one may conclude that low-cost/must-run sources do not appear on the margin and λ_y is equal to zero.

The ex-ante calculation of the operating margin is based on public available documentation issued mainly by the Wholesale Market in Guatemala, by the General Electricity and by the Telecommunications Superintendence in El Salvador.

Option A2 is used in the case of Guatemala and El Salvador when only the data on electricity generation and the fuel types used is available. According to this option, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}$$

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$ = Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$ = Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
m = All power units serving the grid in year *y* except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3

Where several fuel types are used in the power unit, use the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$.

Option A3 is used if for a power unit *m* only data on electricity generation is available, and an emission factor of 0 tCO_2/MWh will be asumed as a simple an conservative approach.

As per the "Tool to calculate the emission factor for an electricity system" (version 2.2.1), for the purpose of determining the operating margin emission factor, one of the following options is to be used in the calculation of the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

0 tCO_2/MWh; or

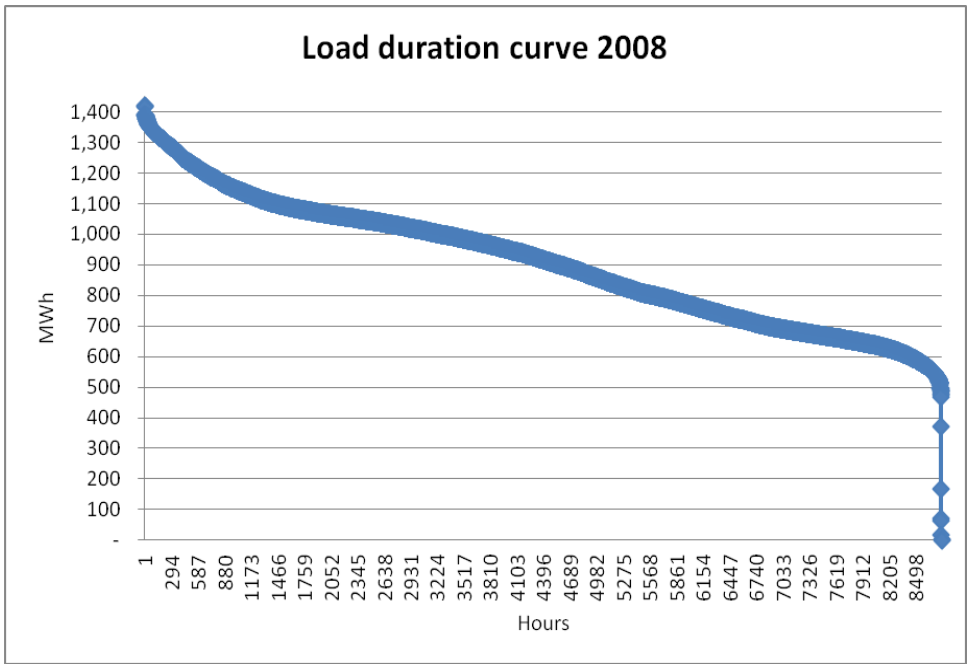
a) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) of the tool; or
b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or
c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) of the tool.

For this PoA, the CME chooses to apply the emission factor of 0 tCO_2/MWh to net electricity imports.

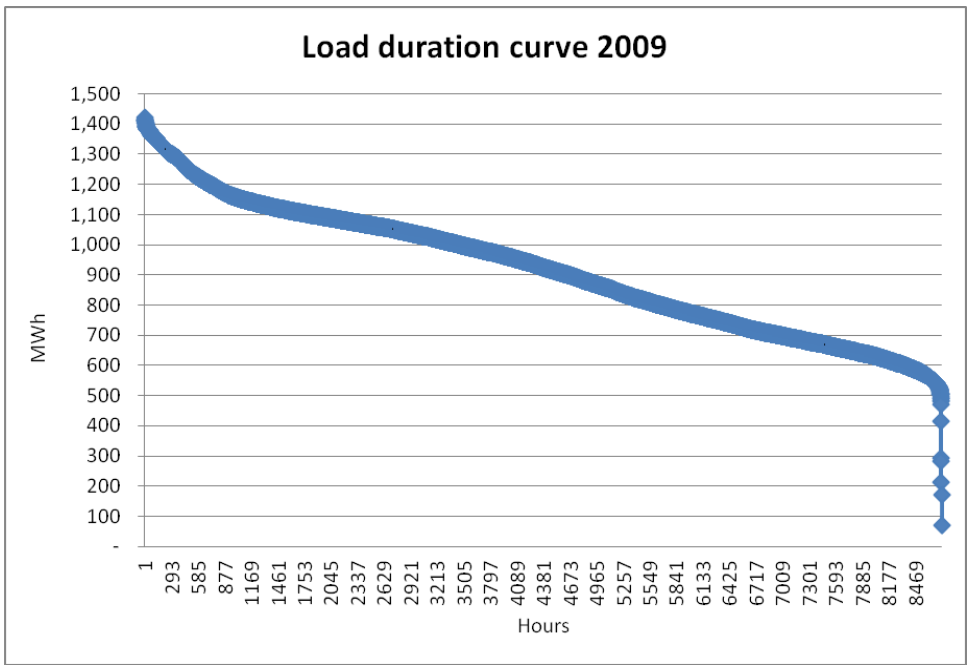
The outcomes of step 4 are[34]:

Guatemalan grid:

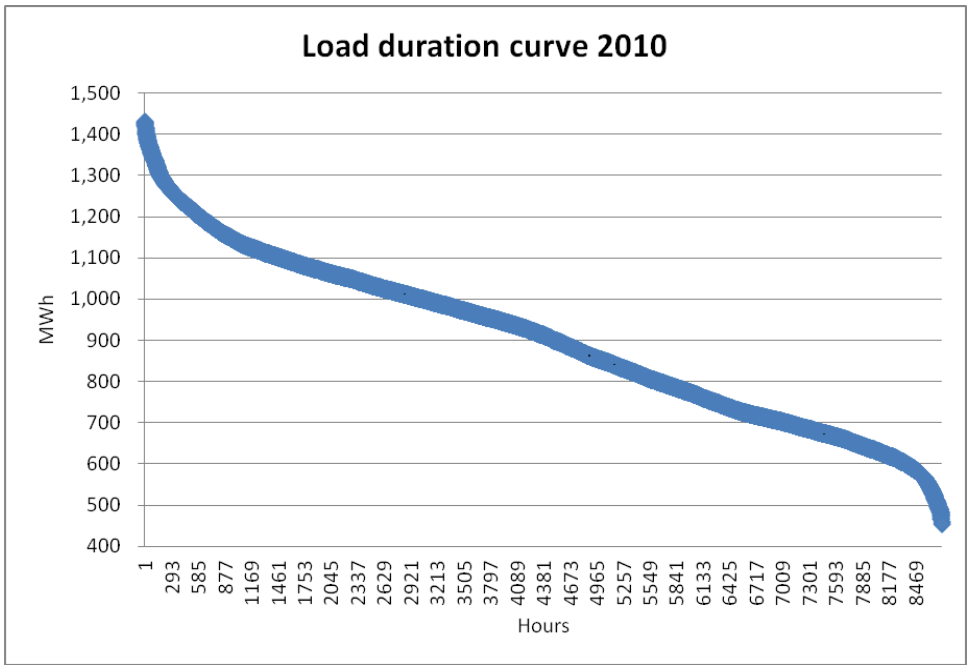
[34] The complete calculation document has been provided to the DOE during the validation process.



Lambda 2008 = 0.007058



Lambda 2009 = 0.001027



Lambda 2010 = 0.053995

	2008	2009	2010
Lambda	0.007058	0.001027	0.053995

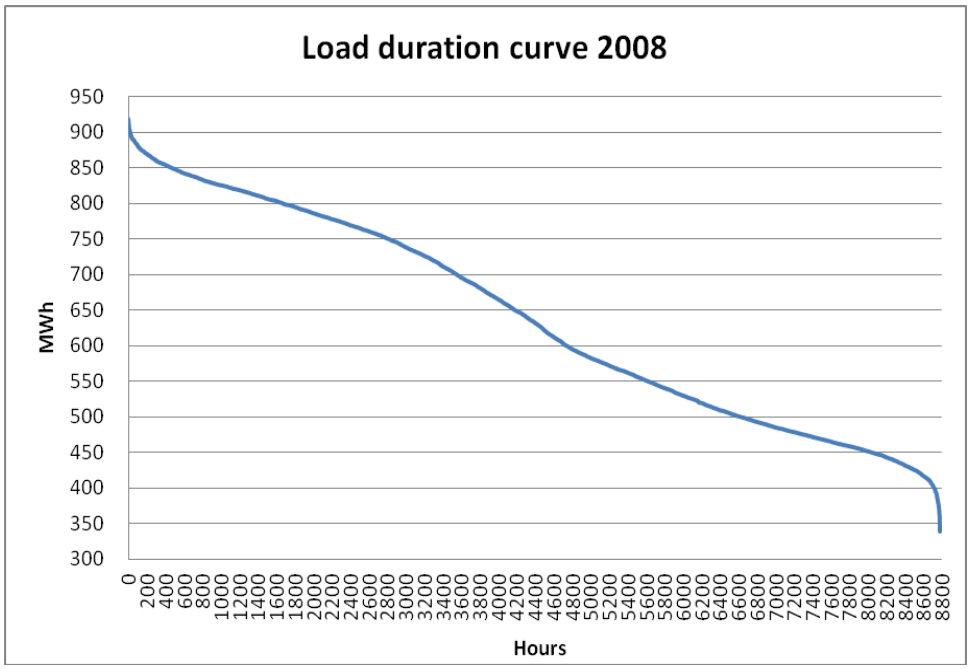
Classification of power plants	Type of fuel	tCO2/yr		
		2008	2009	2010
Non-LCMR	Diesel	12,289	29,166	2,975
	Coal	910,506	551,538	855,035
	Fuel Oil	1,733,717	2,469,359	1,522,136
Total Non-LCMR (tCO2/MWh)		**0.8318**	**0.8258**	**0.8354**
Simple adjusted OM Emission Factor for non-LCMR (tCO_2/MWh)		**0.8259**	**0.8250**	**0.7903**

Classification of power plants	Type of plant	tCO2/yr		
		2008	2009	2010
LCMR	Hydroplants	0	0	0
	Sugar mills	0	0	0
	Geothermal	0	0	0
	Imports	0.00	0.00	0.00
Total LCMR (tCO2/MWh)		**0.000000**	**0.000000**	**0.000000**
Simple adjusted OM Emission Factor for LCMR (tCO2/MWh)		**0.000000**	**0.000000**	**0.000000**

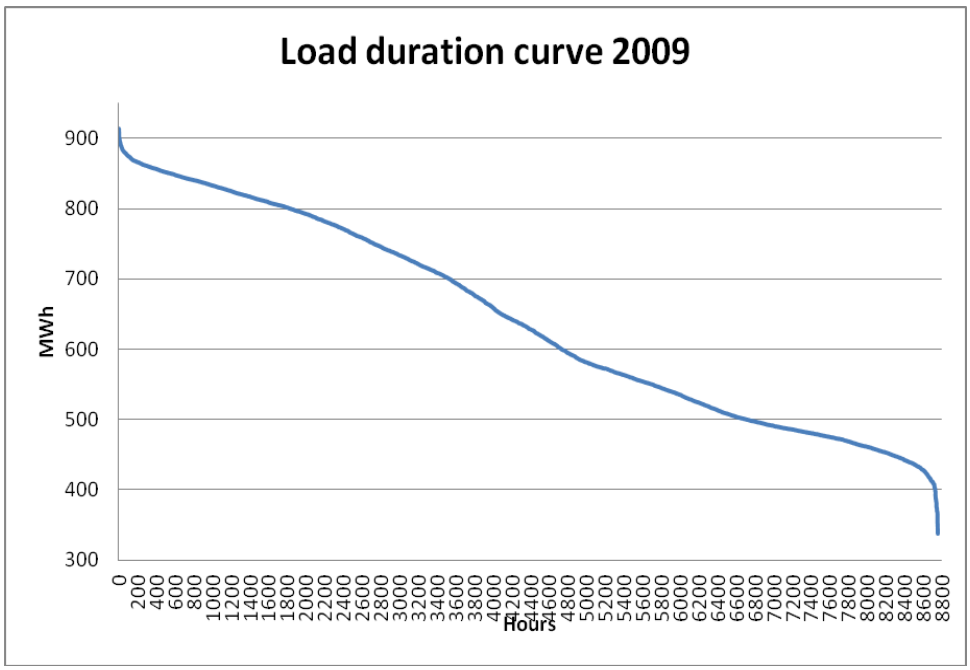
Weighted Simple adjusted OM Emission Factor (tCO2/MWh)	**0.8259**	**0.8250**	**0.7903**

OM Emission Factor tCO2/MWh	**0.8138**

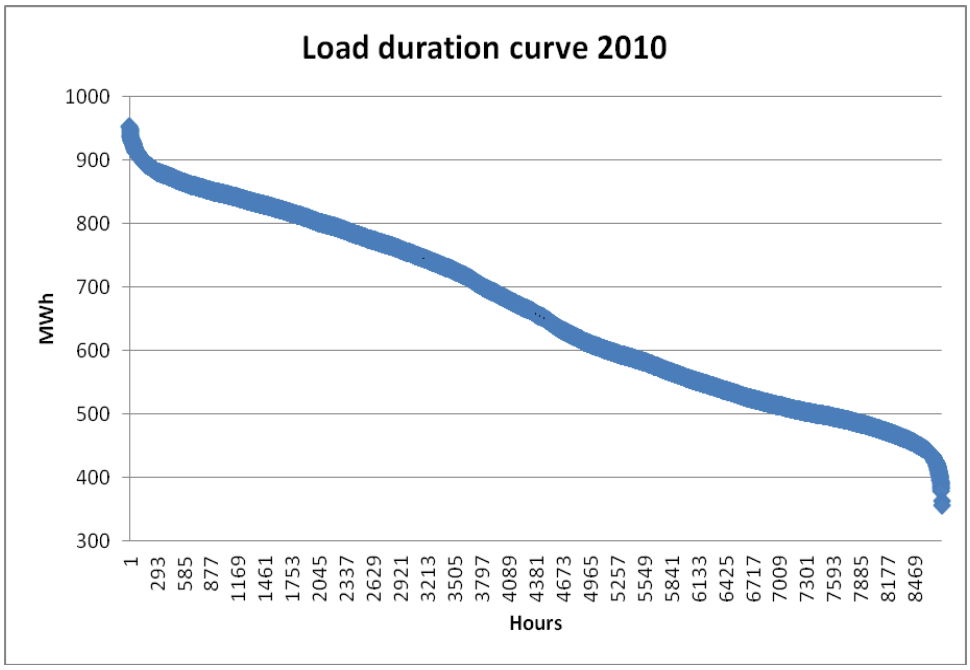
Salvadorian grid:



Lambda 2008 = 0.017418



Lambda 2009 = 0.001484



Lambda 2010 = 0.017694

	2008	2009	2010
Lambda [1]	0.017418	0.0014840	0.017694064
Total Non-LCMR	0.8225	0.8017	0.7923
Simple adjusted OM Emission Factor for non-LCMR(tCO_2/MWh) (1-Lambda)*EF	0.8082	0.8005	0.7783
Total LCMR (MWH x EF /MWh)	0.00000	0.00000	0.00000
Simple adjusted OM Emission Factor for non-LCMR(tCO_2/MWh) (1-Lambda)*EF	0.00000	0.00000	0.00000
Weighted Simple adjusted OM Emission Factor (tCO2/MWh)	0.8082	0.8005	0.7783
Weighted Operating Margin 3 years	**0.7915**	**tCO_2e/MWh**	

1. Sources for lambda:
Statistics of Hourly Summary. Transaction Unit, http://www.ut.com.sv
http://www.ut.com.sv --> "Estadisticas" --> "Reportes" --> "Precios->Resumen Horario"

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

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

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

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For this PoA, Option 1 is chosen for the grid emission factor estimation of both host countries.

As per the tool, capacity additions from retrofits of power plants are not included in the calculation of the build margin.

The sample group of power units *m* used to calculate the build margin shall be determined as per the following procedure:

a) Identify the set of five power units, excluding power units registered as CDM project activities that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$), and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

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

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

   Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Otherwise:

d) Exclude from SET_{sample} 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 ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, 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. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

e) Include in the sample group $SET_{sample\text{-}CDM}$ 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);

f) The sample group of power units *m* used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{->}10yrs}$).

Sample group of power units *m* used to calculate the ex-ante build margin of both grids, will based on DNA published data or on any other public available documentation preferable from the Wholesale Market in Guatemala, by the General Electricity and by the Telecommunications Superintendence in El Salvador, or any of their associated entities; and it will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

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

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance for the simple OM, using options A1, A2 or A3 of the tool, using for **y** the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin. For the estimation of the grid emission factor of El Salvador and Guatemala, option A.2 will be used.

The outcomes of step 5 are:

Guatemalan grid:

The selected SET_{sample} is $SET_{sample\text{-}CDM}$, The set that comprises 20% of the annual electricity generation of the CPA electricity system including CDM plants and excluding those plants that started to supply electricity to the grid more than 10 years ago.

AEG total 2010 non-CDM	7,042,097	MWh	
AEG SET 5-units	5,101	MWh	
SET ≥ 20% [non-CDM] Includes power units with more than 10	1,419,659	MWh	20.160%
SET sample-CMD including CDM and excluding those older than	2,016,875	MWh	28.640%

	Operation year	TOTAL 2010 GWH	CDM	SET 5-units [non-CDM]	SET ≥ 20% [non-CDM] Includes power units with more than 10 years	SET sample-CDM and excluding those older than 10 years
Hydroelectric plants						
CHIXOY	1983	1691.832				
AGUACAPA	1982	317.023				
JURUN	1970	276.289				
ESCLAVOS	1966	44.337				
RIO BOBOS	1995	52.018				
SECACAO	1998	94.400				
PASABIEN	2000	53.805			53.805	
POZA VERDE	2005	35.213			35.213	35.213
LAS VACAS	2002	42.324	Yes			
EL CANADÁ	Nov 2003	233.372	Yes			233.372
MATANZAS + SAN ISIDRO (FROM TECNOG	2002	63.734	Yes			
RENACE	2004	310.536			310.536	310.536
PALIN II	2005	0.000			0.000	0.000
MONTECRISTO	2006	57.306			57.306	57.306
CANDELARIA	2006	23.708	Yes			23.708
EL RECREO (FROM HIDROTAMA)	2008	140.819			140.819	140.819
HIDROXACBAL	2010	259.556	Yes			259.556
PANAN	2010	0.034		0.033741	0.034	0.034
SMALL HYDROS*	See below:	55.620				
* INCLUDES GENERATION FROM: EL SALTO, PORVENIR, CHICHAIC, SANTA MARÍA, SAN JERÓNIMO, CERRO VIVO.						
Santa Maria	1926					
El Salto	1938					
Porvenir	1968					
Chichaic	1979					
San Jeronimo	1996					
Cerro Vivo	2001					
Thermal Plants						
Steam turbines						
SAN JOSE	2000	942.539				
LA LIBERTAD	2008	41.857			41.857	41.857
ARIZONA VAPOR 1	2008	7.797			7.797	7.797
Geothermal						
ORZUNIL	1999	114.429				
CALDERAS	N/A	0.000				
ORTITLAN	2007	144.879	Yes			144.879

SUGAR MILLS						
CONCEPCION	1994	68.54				
PANTALEON	1991	181.03				
PANTALEON EXCEDENTES	2005					
SANTA ANA	1995	122.51				
MAGDALENA	1994	316.56				
MAGDALENA EXCEDENTTES	2005-2006					
LA UNION	1995	151.40				
LA UNION EXCEDENTES	2009					
MADRE TIERRA	1996	87.93				
TULULA	2001	11.26			11.26	
SAN DIEGO	2004	1.39			1.39	1.386
TRINIDAD	2009	38.30			38.30	38.299
DARSA	2004	0.00			0.00	0.000
INTERNAL COMBUSTION						
ARIZONA	2003	643.014			643.014	643.014
LA ESPERANZA (Poliwatt)	2000	454.749				
PQPLLC (Puerto Quetzal Power)	1993	40.223				
LAS PALMAS 1	1998	63.995				
LAS PALMAS 2		67.843				
LAS PALMAS 3		41.134				
LAS PALMAS 4		24.723				
LAS PALMAS 5		14.286				
GENOR	1998	215.690				
SIDEGUA	1996	22.692				
Amatex/ Lagotex / TEXTILES B1 *	1996	23.400				
Amatex/ Lagotex / TEXTILES B2 *	1996	63.967				
Amatex/ Lagotex / TEXTILES B3 *	1996	42.800				
ELECTROGENERACIÓN	2003	32.383			32.383	32.383
GENERADORA PROGRESO	1993	27.108				
GECSA	2007	8.906			8.906	8.906
GECSA2	2008	12.443			12.443	12.443
COENESA	2008	0.057			0.057	0.057
ELECTROCRISTAL BUNKER	2005	10.196			10.196	10.196
Gas Turbines						
TAMPA	1995	2.026				
STEWART & STEVENSON	1995	0.844				
ESC.GAS No. 3	1976	0.120				
ESC.GAS No. 5	1985	0.155				
LAGUNA GAS 1	1978	0.226				
LAGUNA GAS 2	1978	0.000				
Distributed generation (hydroplants)						
SANTA ELENA	2008	0.768	Yes			0.768
KAPLAN CHAPINA	2009	0.569			0.569	0.569
CUEVAMARIA	2009	8.703			8.703	8.703
LOS CERROS	2010	2.794		2.794	2.794	2.794
COVADONGA	2010	1.268		1.268	1.268	1.268
JESBON MARAVILLAS	2010	0.950		0.950	0.950	0.950
EL PRADO	2010	0.055		0.055	0.055	0.055
OSCANA	2010	0.005			0.005	0.005
				5.101	1,419.66	2,016.87

Imports (-)		354.062
Exports (+)		134.522
Net		-219.540

Type of fuel	tCO2/y
Diesel	37.67
Coal	34,567.21
Fuel Oil	492,099.07
Total energy (MWh/y)	**2,016,875**
BM Emission Factor (tCO2/MWh) -2010-	**0.2611**

Salvadorian grid:

The selected SET_{sample} is $SET_{sample\text{-}CDM\text{->}10yrs}$ including CDM plants and plants older than 10 years old.

	Fuel	Operation year	Installed capacity (MW)	TOTAL 2010 MWH		Set 5 Generation	AEG Set >20% non CDM old plants	AEG Set >20% with-CDM new plants	AEG Set >20% with-CDM and old plants
Hydrolectric plants									
Guajoyo		1963	19.8	84,794.6	Capacity addition in 2001				
Cerrón Grande		1977	172.8	723,652.9	Capacity addition in 2005		723,652.9		723,652.9
5 de noviembre		1954	99.4	529,377.2	Capacity addition in 2002				
15 de septiembre		1983	180	741,155.5	Capacity addition in 2007				
Geothermal plants									
Ahuachapan		1975	95	649,818.1	Capacity addition in 1980				
Berlin		1992	109.4	777,639.8	Capacity addition in 2007				
Thermal plants									
Acajutla	Bunker	1965	322.1	532,872.7	Capacity addition and retrofit in 2007				
Soyapango	Bunker	1972	16.2	24,419.6	Capacity modification in 2003				
Nejapa Power	Bunker	1995	144	406,570.7	Capacity addition in 1996-1998		406,570.7		406,570.7
Planta el Rronco/Cement	Bunker	2001	32.6	117,022.2			117,022.2	117,022.2	117,022.2
Inversiones energéticas	Bunker	2006	100.2	590,231.5	Capacity addition in 2009				
Textufil	Bunker	2006	44.1	201,009.6		201,010	201,010	201,010	201,010
Gecsa	Bunker	2007	11.6	56,547.0		56,547	56,547	56,547	56,547
Energía Borelais	Bunker	2007	13.6	54,972.6		54,973	54,973	54,973	54,973
Hilacsa Energy	Bunker	2008	6.8	38,055.1		38,055	38,055	38,055	38,055
Sugar mills									
Compañía azucarera Salv	Biomass	2003	50	109,381.3	Capacity modification in 2010				
Ingenio El Ángel	Biomass	2008	22.5	42,813.9	CDM			42,813.9	42,813.9
Ingenio la Cabaña	Biomass	2008	21	27,460.9		27,461	27,461	27,461	27,461
Total									
						378,045	**1,625,291**	**537,881**	**1,668,105**
						6.67%	**28.69%**	**9.49%**	**29.45%**

Source:

Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence (SIGET). Tables 7 (page 52), 10 (page 57), 15 (page 62) and 16 (page 63)

Notes:

Only the year of the most recent capacity addition has been included in this chart.
Only capacity additions and retrofits within the most recent 10 years have been excluded from the calculation of the Build Margin.

AEG total 2010 non-CDM	**5,664,981.30**	**MWh**
SET ≥ 20% including CDM and older than 10 years	**1,668,105**	**MWh**
	29.45%	

Build Margin Emission Factor	**0.4139**	**tCO_2e/MWh**

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

The combined margin emissions factor is is based on one of the following methods:

a) Weighted average CM; or
b) Simplified CM.

The weighted average CM is the preferred method; and the simplified CM method 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 choice of one method over the other one is justified in the individual grid emission factor calculation for each host country.

The weighted average is calculated as follows:

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

Where:

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

As per the "Tool to calculate emission factor for an electricity system, version 02.2.1", for hydropower projects, the default weights for are as follows: w_{OM} = 0.50 and w_{BM} = 0.50.

The outcomes of step 5 are:

CM Emission Factor of the Guatemalan grid: 0.5375 tCO_2/MWh
CM Emission Factor of the Salvadorian grid: 0.6027 tCO_2/MWh

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

As per paragraph 23 of AMS I.D. v.17, the SSC-CPA emission reductions for a SSC-CPA are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	Emission reductions in year *y* (t CO_2/y)
BE_y	Baseline Emissions in year *y* (t CO_2/y)
PE_y	Project emissions in year *y* (t CO_2/y)
LE_y	Leakage emissions in year *y* (t CO_2/y)

Project emissions:

As per AMS I.D v17, emissions from water reservoirs of hydro power plants have to be considered following the procedure described in the most recent version of ACM0002; and CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

As per the methodology ACM0002 version 12.3.0, the SSC-CPA project emissions are calculated as follows:

$$PE_y = PE_{FC,\,y} + PE_{GP,\,y} + PE_{HP,\,y}$$

Where:

PE_y = Project emissions in year *y* (tCO_2e/yr)
$PE_{FC,\,y}$ = Project emissions from fossil fuel consumption in year *y* (tCO_2/yr)
$PE_{GP,\,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)
$PE_{HP,\,y}$ = Project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

Emissions from fossil fuel consumption ($PE_{FC,i,y}$)

CO_2 emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$	Are the project emissions from fossil fuel consumption in process *j* during year *y* (tCO_2/y)
$FC_{i,j,y}$	Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr)
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type *i* in year y (tCO_2/mass or volume unit)
i	Are the fuel types combusted in process *i* during the year *y*

The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using one of the following two Options, depending on the availability of data on the fossil fuel type *i*, as follows:

Option A: The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on the chemical composition of the fossil fuel type *i*, using the following approach:

If $FC_{i,j,y}$ is measured in a mass unit:

$$COEF_{i,y} = w_{C,i,y} \times 44/12$$

If FCi,j,y is measured in a volume unit:

$$COEF_{i,y} = w_{C,i,y} \times \rho_{i,y} \times 44/12$$

Where:
$COEF_{i,y}$ Is the CO_2 emission coefficient of fuel type *i* (tCO_2/mass or volume unit)
$w_{C,i,y}$ Is the weighted average mass fraction of carbon in fuel type *i* in year *y* (tC/mass unit of the fuel)
$\rho_{i,y}$ Is the weighted average density of fuel type *i* in year *y* (mass unit/volume unit of the fuel)
i Are the fuel types combusted in process *j* during the year *y*

Option B: The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type *i*, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:
$COEF_{i,y}$ Is the CO_2 emission coefficient of fuel type *i* (tCO_2/mass or volume unit)
$NCV_{i,y}$ Is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$ Is the weighted average CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)
i Are the fuel types combusted in process *j* during the year *y*

As per the Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 2, Option A should be the preferred approach, if the necessary data is available.

Emissions from the operation of geothermal plants ($PE_{GP,y}$)

As per eligibility criterion 3 $PE_{GP,y}$ =0 since the SSC-PoA does not comprise geothermal power plants.

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

As per paragraph 20 of AMS I.D v17, emissions from water reservoirs of hydro power plants are to be considered as PE and shall be estimated following the procedure described in the most recent version of ACM0002.[35] At the validation start date of this SSC-PoA, the valid version of the methodology ACM0002 is version 12.3.0. The estimation of PE for each SSC-CPA included in this PoA during the first crediting period shall follow the procedure of such methodology.

For project activities in which the power density is greater than 10 W/m^2, $PE_{HP,y}$ =0, as per eligibility criterion 12, no project emissions will be generated from the operation of the SSC-CPA. Nonetheless to assure that the SSC-CPA is not generating GHG emissions from its operation, the estimation of the power density shall be provided in each SSC-CPA-DD; and it will be done as explained below.

[35] ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

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

Where:

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

Leakage:

For all SSC-CPAs LE_y are 0.

Baseline Emissions:

Baseline Emissions will be calculated as:

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

Where:

BE_y	Baseline Emissions in year *y* (tCO_2)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{grid,\,CM,\,y}$	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the "Tool to calculate the emission factor for an electricity system", version 2.2.1 (tCO_2/MWh)

Calculation of $EG_{PJ,\,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. These cases are described next:

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

(b) Retrofit or replacement of an existing renewable energy power plant

If the project activity is the retrofit or replacement of an existing grid-connected renewable power plant, the baseline scenario is the continuation of the operation of the existing plant. For hydro power plants, if the replacement involves the installation of a hydro power plant in a new reservoir, then the applicability conditions on multiple reservoirs must be satisfied by the project activity.

The methodology uses historical electricity generation data to determine the electricity generation by the existing plant in the baseline scenario, assuming that the historical situation observed prior to the implementation of the project activity would continue.

The power generation of renewable energy projects can vary significantly from year to year, due to natural variations in the availability of the renewable source (e.g. varying rainfall, wind speed or solar radiation). The use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity.

$EG_{PJ,y}$ is calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} - (EG_{historical} + \sigma_{historical})\text{; until } DATE_{BaselineRetrofit}$$

and

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EG_{historical}$	=	Annual average historical net electricity generation delivered 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/yr)
$\sigma_{historical}$	=	Standard deviation of the annual average historical net electricity generation delivered 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/yr)
$DATE_{BaselineRetrofit}$	=	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

$EG_{historical}$ is the annual average of historical net electricity generation, delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity. To determine $EG_{historical}$, project participants may choose between 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.

Project participants may choose among the following two time spans of historical data to determine $EG_{historical}$:

(a) The five last calendar years prior to the implementation of the project activity; or
(b) 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 five calendar years, where $DATE_{hist}$ is latest point in time between:
  (i) The commercial commissioning of the plant/unit;
  (ii) If applicable: the last capacity addition to the plant/unit; or
  (iii) If applicable: the last retrofit of the plant/unit.

(c) Capacity addition to an existing renewable energy power plant

The addition of a new power plant or unit may in some cases affect the electricity generated by the existing plant(s) or unit(s). For example, a new hydro turbine installed at an existing dam may affect the power generation by the existing turbines. If this is the case, the Project Participant shall use the same approach as for retrofits and replacements (according to the applied methodology, there is no need of a separate metering of the electricity fed into the grid by the added capacity).

In the case where the addition of new capacity does not affect the electricity generated by existing plant(s) or unit(s), the following approach can be used provided that the electricity fed into the grid by the added power plant(s) or unit(s) addition is separately metered:

$$EG_{PJ,y} = EG_{PJ_Add,y}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{PJ_Add,y}$	=	Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity (MWh/yr)

Project participants should document in the SSC-CPA-DD which option is applied.

Calculation of $DATE_{BaselineRetrofit}$

In order to estimate the point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity ($DATE_{BaselineRetrofit}$), project participants may take the following approaches into account:

(a) The typical average technical lifetime of the type equipment may be determined and documented, taking into account common practices in the sector and country, e.g. based on industry surveys, statistics, technical literature, etc.;

(b) The common practices of the responsible company regarding replacement/retrofitting schedules may be evaluated and documented, e.g. based on historical replacement/retrofitting records for similar equipment.

The point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity should be chosen in a conservative manner, i.e. if a range is identified, the earliest date should be chosen.

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

Guatemalan Grid calculation

Data/Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	$EF_{OM,y}$ is the average operating margin CO_2 emission factor of power plant connected to the host country electricity grid in 3 recent years available data. For Guatemala it is calculated as the simple adjusted OM method. During the first crediting period, this factor is calculated based on ex-ante emissions.
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2008, 2009, 2010: http://www.amm.org.gt/ Installed capacity in the National Electric System: www.amm.org.gt/pdfs/capacidad_instalada.pdf Guatemalan Centre of Research and Capacity Building on Sugar Reed, Cengicana: www.cengicana.org/ Statistics Report, Year 10, No.2, November 2009.
Value applied:	0.8138
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{OM,y}$ is estimated at PoA level and fixed for the first crediting period and would revised during the next crediting period.

Data/Parameter:	$EG_{m,2008}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year *2008*
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2008: http://www.amm.org.gt/
Value applied:	3,193,774
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2008}$

Data/Parameter:	$EG_{k,2008}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2008
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2008: http://www.amm.org.gt/
Value applied:	4,714,381
Justification of the choice of data or	No measurement required. Data is obtained based on publicly available information.

description of measurement methods and procedures actually applied:	
Any comment:	This value is used to estimate the $EF_{OM,2008}$

Data/Parameter:	$EG_{m,2009}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year 2009
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2009: http://www.amm.org.gt/
Value applied:	3,693,376
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2009}$

Data/Parameter:	$EG_{k,2009}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2009
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2009: http://www.amm.org.gt/
Value applied:	4,195,173
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2009}$

Data/Parameter:	$EG_{m,2010}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year 2010
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2010: http://www.amm.org.gt/
Value applied:	2,849,222
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2010}$

Data/Parameter:	$EG_{k,\ 2010}$

Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2010
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2010: http://www.amm.org.gt/
Value applied:	4,961,216
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,\ 2010}$

Data/Parameter:	$EF_{BM,2010}$
Data unit:	tCO_2/MWh
Description:	$EF_{BM,y}$ is the build margin CO_2 emission factor of power plants connected to the host country electricity grid in year 2010, calculated ex-ante based on the $SET_{sample\text{-}CDM}$ including power plants registered under the CDM and excluding those older than 10 years.
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2010: http://www.amm.org.gt/ Installed capacity in the National Electric System: www.amm.org.gt/pdfs/capacidad_instalada.pdf
Value applied:	0.2611
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{BM,2010}$ is estimated at PoA level and fixed for the first crediting period and would revised during the next crediting period.

Data/Parameter:	$EG_{m,2010}$
Data unit:	MWh
Description:	Net electricity generated by sample group of power units *m* in year 2010
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2010: http://www.amm.org.gt/
Value applied	2,016,875
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{BM,2010}$

Data/Parameter:	$EF_{CM,y}$

Data unit:	tCO_2/MWh
Description:	$EF_{CM,y}$ is the combined margin CO_2 emission factor of power plants connected to the host country electricity grid in year 'y', calculated ex-ante based on the weighted average of $EF_{OM,y}$ and $EF_{BM,y}$
Source of data to be used:	Administration of the Wholesale Market; Executed Load Dispatch from the Interconnected National System, 2008, 2009, 2010: http://www.amm.org.gt/ Installed capacity in the National Electric System: www.amm.org.gt/pdfs/capacidad_instalada.pdf Guatemalan Centre of Research and Capacity Building on Sugar Reed, Cengicana: www.cengicana.org/ Statistics Report, Year 10, No.2, November 2009.
Value applied:	0.5375
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{CM,y}$ is estimated at PoA level and it is fixed for the first crediting period. It would be revised during the next crediting period.

Data/Parameter:	$\eta_{m,y}$
Data unit:	-
Description:	Average net energy conversion efficiency of power unit *m* in year *y*
Source of data to be used:	The default values provided in the table in Annex 1 of the *Tool to calculate the emission factor for an electricity system* (v. 2.2.1) were used.
Value applied:	As per Annex 1 of the *Tool to calculate the emission factor for an electricity system* (v. 2.2.1)
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	For conservativeness reasons, whenever data of the type of technology is not available, the efficiency has been chosen as the highest efficiency of the applicable options.

Data/Parameter:	$\eta_{k,y}$
Data unit:	-
Description:	Average net energy conversion efficiency of power unit *k* in year y
Source of data to be used:	The default values provided in the table in Annex 1 of the Tool to calculate the emission factor for an electricity system (v. 2.2.1) were used.
Value applied:	37.5% and 39%
Justification of the choice of data or description of measurement methods	No measurement required. Data is obtained based on publicly available information.

and procedures actually applied:	
Any comment:	For conservativeness reasons, whenever data of the type of technology is not available, the efficiency has been chosen as the highest efficiency of the applicable options.

El Salvadorian Grid calculation

Data/Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	$EF_{OM,y}$ is the average operating margin CO_2 emission factor of power plant connected to the host country electricity grid in 3 recent years available data. For El Salvador it is calculated as the simple adjusted OM method. During the first crediting period, this factor is calculated based on ex-ante emissions.
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET) Type of Fuel Report. Transaction Unit, http://www.ut.com.sv
Value applied:	0.7915
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{OM,y}$ is estimated at PoA level and fixed for the first crediting period and would revised during the next crediting period.

Data/Parameter:	$EG_{m,2008}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year 2008
Source of data to be used:	Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET)
Value applied:	2,163,695
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2008}$

Data/Parameter:	$EG_{k,2008}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2008
Source of data to be used:	Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET)

Value applied:	3,643,653
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2008}$

Data/Parameter:	$EG_{m,2009}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year 2009
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv
Value applied:	2,449,317
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2009}$

Data/Parameter:	$EG_{k,2009}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2009
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv
Value applied:	3,272,607
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2009}$

Data/Parameter:	$EG_{m,2010}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year 2010
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv
Value applied:	2,021,701
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.

Any comment:	This value is used to estimate the $EF_{OM,2010}$

Data/Parameter:	$EG_{k,2010}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *k* in year 2010
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv
Value applied:	3,860,292
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	This value is used to estimate the $EF_{OM,2010}$

Data/Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/MWh
Description:	$EF_{BM,y}$ is the build margin CO_2 emission factor of power plants connected to the host country electricity grid in year 2010, calculated ex-ante based on the SET $_{sample\text{-}CDM\text{->}10yrs}$ including power plants registered under the CDM and those older than 10 years.
Source of data to be used:	Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET) Type of Fuel Report. Transaction Unit, http://www.ut.com.sv
Value applied:	0.4139
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{BM,y}$ is estimated at PoA level and fixed for the first crediting period and would revised during the next crediting.

Data/Parameter:	$EG_{m,2010}$
Data unit:	MWh
Description:	Net electricity generated by sample group of power units m in year 2010
Source of data to be used:	Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET) Type of Fuel Report. Transaction Unit, http://www.ut.com.sv
Value applied:	1,668,105
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.

Any comment:	This value is used to estimate the $EF_{BM,2010}$

Data/Parameter:	$EF_{CM,y}$
Data unit:	tCO_2/MWh
Description:	$EF_{CM,y}$ is the combined margin CO_2 emission factor of power plants connected to the host country electricity grid in year 'y', calculated ex-ante based on the weighted average of $EF_{OM,y}$ and $EF_{BM,y}$
Source of data to be used:	Schedule Summary of Wholesale Electricity Market from Jan 1, 2008 to December 31, 2010. Transaction Unit, http://www.ut.com.sv Electric Statistics Bulletin No. 12 2010. General Electricity and Telecommunications Superintendence. (SIGET) Type of Fuel Report. Transaction Unit, http://www.ut.com.sv Statistics of Hourly Summary. Transaction Unit, http://www.ut.com.sv
Value applied:	0.6027
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	The value of $EF_{CM,y}$ is estimated at PoA level and it is fixed for the first crediting period. It would be revised during the next crediting period.

Data/Parameter:	$\eta_{m,y}$
Data unit:	-
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data to be used:	The default values provided in the table in Annex 1 of the *Tool to calculate the emission factor for an electricity system* (v. 2.2.1) were used.
Value applied:	As per Annex 1 of the *Tool to calculate the emission factor for an electricity system* (v. 2.2.1)
Justification of the choice of data or description of measurement methods and procedures actually applied:	No measurement required. Data is obtained based on publicly available information.
Any comment:	For conservativeness reasons, because data of the type of technology is not available, the efficiency has been chosen as the highest efficiency of the applicable options.

Baseline information

Data / Parameter:	Cap_{BL}
Data unit:	MW
Description:	Installed capacity of the power plant before the implementation of the project activity.
Source of data to be used:	Detailed Project Report/Purchase contracts if available

Value applied:	To be provided in the CDM-SSC-CPA-DD form
Justification of the choice of data or description of measurement methods and procedures actually applied:	The values reflect the expected capacity to be installed at the power plant according to the plant design parameters; therefore, it is based on the nameplate capacity at the generator installed before the project activity.
Any comment:	This value shall be zero in case of Greenfield projects.

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the existing reservoir prior to the implementation of the project activity, measured in the surface of the water, before the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project Site (measured from topographical surveys, maps, satellite pictures, etc.)
Value applied:	To be provided in the CDM-SSC-CPA-DD form
Justification of the choice of data or description of measurement methods and procedures actually applied:	The design of the hydro power plant, including its dam, clearly defines the expected water surface area.
Any comment:	This value shall be zero in case of Greenfield projects

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 to be used:	Company registries from previous measurements of electricity meter(s)
Value applied:	To be specified in each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	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): (a) The three last calendar years (five calendar years for hydro project) prior to implementation of the project activity; or (b) The time period from the calendar year following *DATEhist*, 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 *DATEhist* is latest point in time between: (i) The commercial commissioning of the plant/unit; (ii) If applicable: the last capacity addition to the plant/unit; or (iii) If applicable: the last retrofit of the plant/unit

	Measurement registries will be crossed-check with records for sold electricity.
Any comment:	Only applicable for non-Greenfield projects

Data / Parameter:	$DATE_{BasselineRetrofit}$
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 to be used:	Project activity site.
Value applied:	To be specified in each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per option a or b specified in section E.6.2 of the PoA-DD. The date shall be verified with information assessed or developed by a third party.
Any comment:	Only applicable for non-Greenfield projects.

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 to be used:	Project activity site
Value applied:	To be specified in each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	$DATE_{hist}$ is the latest point in time between: (i) The commercial commissioning of the plant/unit; (ii) If applicable: the last capacity addition to the plant/unit; or (iii) If applicable: the last retrofit of the plant The date shall be verified with internal registries.
Any comment:	Only applicable for non-Greenfield projects

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

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

Based on AMS I.D. v17, the following data and parameters will be monitored during the project crediting period:

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity supplied to the grid by the project plant/unit in year ***y***
Source of data to be used:	Measured by electricity meter(s)

Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each CPA
Description of measurement methods and procedures to be applied:	The net electricity production will be measured continuously and recorded at least, monthly. The net electricity is calculated by subtracting the electricity exported with the electricity imported by the CPA. However, project participants will install bidirectional meters, which direct reading corresponds to the net energy generated by the project and to be supplied to the grid. The accuracy and precision of the meters shall not be lower than the level defined as per national standards at the date of installation. Additionally, the equipment shall be calibrated and tested according to recognized standards, as stated in E.7.2.
QA/QC procedures to be applied:	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years[36].
Any comment:	Additionally, measurement results will be cross-checked with records for sold electricity.

Data / Parameter:	$\sigma_{historical}$
Data unit:	MWh
Description:	Standard deviation of the annual average historical net electricity generation delivered 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 to be used:	Calculated from data used to establish $EG_{historical}$ parameter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each CPA
Description of measurement methods and procedures to be applied:	Parameter to be calculated as the standard deviation of the annual generation data used to calculate $EG_{historical}$ for retrofit or replacement project activities.
QA/QC procedures to be applied:	-
Any comment:	Only applicable for non-Greenfield projects.

Data / Parameter:	$PE_{FC,j,y}$
Data unit:	tCO_2/yr
Description:	Project emissions from fossil fuel consumption in process *j* during year *y*

[36] As per the "General Guidelines to SSC CDM methodologies" version 17.

Source of data to be used:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each SSC-CPA
Description of measurement methods and procedures to be applied:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
QA/QC procedures to be applied:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
Any comment:	This parameter will be monitored only when the SSC-CPA comprises a fossil fuel backup engine.

Data / Parameter:	$FC_{i,j,y}$
Data unit:	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description:	Quantity of fuel type *i* combusted in process *j* during the year *y*
Source of data to be used:	Onsite measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each SSC-CPA
Description of measurement methods and procedures to be applied:	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Any comment:	Monitoring frequency shall be continuous. If the project emission of fuel is less than 1% of total emission reduction, then this project emission could be excluded.

	This parameter will be monitored only when the CPA comprises a fossil fuel backup engine.

Data / Parameter:	$w_{C,i,y}$
Data unit:	tC/mass unit of the fuel
Description:	Weighted average mass fraction of carbon in fuel type *i* in year *y*
Source of data to be used:	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each SSC-CPA
Description of measurement methods and procedures to be applied:	Measurements should be undertaken in line with national or international fuel standards.
QA/QC procedures to be applied:	Verify if the values under a) and b) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in b) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Any comment:	The mass fraction of carbon should be obtained for each fuel delivery, from which weighted average annual values should be calculated. This parameter will be monitored only when the SSC-CPA comprises a fossil fuel backup engine, and if equations of Option A described in section E.6.2 of the SSC-PoA-DD is used to estimate $COEF_{i,y.}$

Data / Parameter:	$\rho_{i,y}$
Data unit:	Mass unit/volume unit
Description:	Weighted average density of fuel type *i* in year *y*
Source of data to be used:	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for

		liquid fuels and should be based on well-documented, reliable sources (such as national energy balances).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each SSC-CPA	
Description of measurement methods and procedures to be applied:	Measurements should be undertaken in line with national or international fuel standards.	
QA/QC procedures to be applied:	-	
Any comment:	The density of the fuel should be obtained for each fuel delivery, from which weighted average annual values should be calculated. This parameter will be monitored only when the SSC-CPA comprises a fossil fuel backup engine, and if equation $COEF_{i,y} = w_{C,i,y} \times \rho_{i,y} \times 44/12$ of Option A described in section E.6.2 of the PoA-DD is used to estimate $COEF_{i,y}$. Preferably the same data source should be used for $w_{C,i,y}$ and $\rho_{i,y}$.	

Data / Parameter:	$NCV_{i,y}$	
Data unit:	GJ per mass or volume unit (e.g. GJ/m³, GJ/ton)	
Description:	Weighted average net calorific value of fuel type *i* in year *y*	
Source of data to be used:	The following data sources may be used if the relevant conditions apply:	
	Data source	**Conditions for using the data source**
	a) Values provided by the fuel supplier in invoices	This is the preferred source if the fraction of the fuel is not provided (Option A)
	b) Measurements by the project participants	If a) is not available
	c) Regional or national default values	If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances).
	d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	If a) is not available
Value of data applied	To be specified in each SSC-CPA	

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	For a) and b): Measurements should be undertaken in line with national or international fuel standards
QA/QC procedures to be applied:	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Any comment:	For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account This parameter will be monitored only when the SSC-CPA comprises a fossil fuel backup engine, and if equation $COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$ of Option A described in section E.6.2 of the PoA-DD is used to estimate $COEF_{i,y}$.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor of fuel *i* in year *y*
Source of data to be used:	The following data sources may be used if the relevant conditions apply:

Data source	**Conditions for using the data source**
a) Values provided by the fuel supplier in invoices	This is the preferred source
b) Measurements by the project participants	If a) is not available
c) Regional or national default values	If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances).
d) IPCC default values at the upper limit of the uncertainty at a 95%confidence interval as provided in table 1.4 of chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	If a) is not available

Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be specified in each SSC-CPA
Description of measurement methods and procedures to be applied:	For a) and b): Measurements should be undertaken in line with national or international fuel standards.
QA/QC procedures to be applied:	-
Any comment:	For a) and b): The CO_2 emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated. For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account Applicable where option B is used. For a): If the fuel supplier does provide the NCV value and the CO_2 emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO_2 factor should be used. If another source for the CO_2 emission factor is used or no CO_2 emission factor is provided, Options b), c) or d) should be used.

Data / Parameter:	Cap_{PJ}
Data unit:	MW
Description:	Installed capacity of the power plant after the implementation of the project activity.
Source of data to be used:	Detailed Project Report/Purchase contracts if available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be provided in the CDM-SSC-CPA-DD form
Description of measurement methods and procedures to be applied:	The values reflect the expected capacity to be installed at the power plant according to the plant design parameters; therefore, it is based on the nameplate capacity at the generator installed for the project activity.
QA/QC procedures to be applied:	-
Any comment:	The final capacity that will be installed at the plant might differ from the value declared the CPA-DD since the technical parameters planned initially at the time of preparation of the SSC-CPA DD might undergo alterations during project implementation.

Data / Parameter:	A_{PJ}

Data unit:	m^2
Description:	Area of the new reservoir, measured in the surface of the water after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project Site (measured from topographical surveys, maps, satellite pictures, etc.)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be provided in the CDM-SSC-CPA-DD form
Description of measurement methods and procedures to be applied:	The design of the hydro power plant, including its dam, clearly defines the expected water surface area when the reservoir is full.
QA/QC procedures to be applied:	-
Any comment:	This parameter shall only be applied for non runoff river hydro power plants.

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

1. Monitoring Plan Objective and Organization

The purpose of the monitoring plan is to measure the net electricity delivered to the local electricity grid by the CPA at the interconnection point. The net electricity is calculated by subtracting the electricity exported with the electricity imported by the CPA; however, because Project Participants will use bidirectional meters, the direct reading of these bidirectional meters will correspond to the net electricity generated by the project and to be supplied to the grid.

Details of the CPA monitoring plan will be described for each CPA but shall comprise the procedures outlined in this section.

2. Monitoring Data and archiving

In the host countries, procedures for meter reading are normally specified in the PPA. The detailed monitoring procedures will be established for each CPA on the basis of the PPA. As a general guidance, at PoA level the Project Participants can only state that the monitoring data will be derived from periodic electricity meter records kept by the project owners and/or the grid company, which will be crosschecked with actual invoices sent by project owners to the grid company. The operator of the hydro plant will be responsible for collecting the monitoring data and will provide the Coordinating and Managing Entity with meter readings for the net electricity delivered and if applicable, calibration certificates.

For each SSC-CPA, the electricity meters (main and back-up) will be installed at the point in which the power plant delivers the energy to the grid (the interconnection point). These electricity meters will be the revenue meters that will measure the quantity of electricity that the project will be paid for and that is monitored simultaneously by the grid company and the CPA owner. Therefore, technical transmission losses from the power plant to the interconnection point will be already accounted for, since the readings

of the meters will correspond to the net electricity delivered to grid at the interconnection point.

In case the main meter of SSC-CPAs breaks down, the net electricity delivered to the local grid will be derived from a back-up meter installed and operated by the project owners and/or the grid company. Furthermore, in the worst case, if there is no back-up revenue meter available at the interconnection point, the CME and the Project Participant will not claim any emission reductions during the breaking down of main revenue meter.

The data will be archived electronically and be stored for two years after the end of the crediting period of each SSC-CPA by the Coordinating and Managing Entity.

3. Quality Assurance and Quality Control

The location of the meters is detailed in each CPA. The project entity will implement QA & QC measures to calibrate and guarantee the accuracy of metering and safety of the project operation.

The metering devices should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once every three years[37]. The grid company and the project owners are responsible for operation and maintenance of their respective electricity meters.

The meter(s) reading will be readily accessible for the Designated Operational Entity (DOE) carrying out the verification of monitoring data.

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

The baseline and monitoring sections have been prepared by South Pole Carbon Asset Management Ltd. (www.southpolecarbon.com). South Pole Carbon Asset Management Ltd., as project participant, is assisting Neosa in project development and implementation.

Date: September 12, 2012

Company name:	South Pole Carbon Asset Management Ltd.
Contact person:	Ms. Adela Terroba Estrada
E-mail:	a.terroba@southpolecarbon.com
Company name:	South Pole Carbon Asset Management Ltd.
Contact person:	Mr. Francisco Garcia
E-mail:	f.koch@southpolecarbon.com
Company name:	South Pole Carbon Asset Management Ltd.
Contact person:	Mr. Christoph Sutter
E-mail:	c.sutter@southpolecarbon.com
Company name:	South Pole Carbon Asset Management Ltd.
Contact person:	Mr. Patrick Horka

[37] As per the "General Guidelines to SSC CDM methodologies" version 17.

E-mail: p.horka@southpolecarbon.com

Annex 1

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

Organization:	*Negocios Energeticos de Occidente, S.A.* (NEOSA)
Street/P.O.Box:	7 Avenida 7-33 Zona 9
Building:	
City:	Guatemala City
State/Region:	
Postfix/ZIP:	
Country:	Guatemala
Telephone:	+502-2279-9000
FAX:	+502-2279-9000
E-Mail:	dsamayoa@occidente.com.gt
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Brunelle
Middle Name:	Kemp
First Name:	Gerald
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	South Pole Carbon Asset Management Ltd.
Street/P.O.Box:	Technoparkstrasse 1
Building:	
City:	Zurich
State/Region:	
Postfix/ZIP:	8005
Country:	Switzerland
Telephone:	+ 41 43 501 35 50
FAX:	+ 41 43 591 35 99
E-Mail:	
URL:	www.southpolecarbon.com
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Heuberger
Middle Name:	
First Name:	Renat
Mobile:	+ 41 43 501 35 50
Direct FAX:	
Direct tel:	registration@southpolecarbon.com

Personal E-Mail:	registration@southpolecarbon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The Alliance Hydroelectric Programme of Activities is not receiving any public funding.

Annex 3

BASELINE INFORMATION

To be provided at CPA level.

Annex 4

MONITORING INFORMATION

To be provided at CPA level.

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