PROGRAMME DESIGN DOCUMENT FORM FOR SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-PoA-DD) Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

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Programme of Activities for Small Scale Hydropower CDM in Sri Lanka
Version : 03
Date : 06 / 08 / 2013

A.2. Purpose and general description of the PoA

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Policy/measure or stated goal of the PoA

Sri Lanka is heavily dependent on imported fossil fuel to meet its annual energy demand. Sri Lanka's annual oil import bill is 60% of its total export income and more than 25% of its annual total import bill. When the economy is expected to grow by 8%, the annual energy demand will grow by at least 6%. Country's high dependence on fossil fuel will gradually increase its GHG emission.

The government has given priority to develop its renewable energy potentials and taken Non-conventional Renewable Energy (NCRE) as the fourth resource of the nation's diversification and security of energy strategy[1].

In the renewable energy sector, small hydropower generation has great potential. Sri Lanka has large number of small scale hydropower projects distributed across the country. However, most of the small hydropower projects are not attractive to investors due to low return on investment. The government encourages investors to use CDM mechanism to make these small hydro projects viable.

Sri Lankan government has established Sri Lanka Carbon Fund (Pvt.) Ltd. (SLCF)[2] as a dedicated institution to encourage and facilitate investors to use CDM mechanism to mitigate country's GHG emissions.

This PoA involves implementation of small hydropower project (CPA) to avoid the emissions of Carbon Dioxide to the atmosphere from the fossil fuel based power generation that would have otherwise been implemented to supply electricity to the people.

General operating and implementing framework of PoA

This Programme of Activities for small scale hydropower CDM in Sri Lanka (hereinafter "PoA") is to promote small hydropower generation in Sri Lanka through Clean Development Mechanism and to reduce GHG emission.

[1] National Energy Policy & Strategies of Sri Lanka, Gazette No. 1553/10 of June 10, 2008

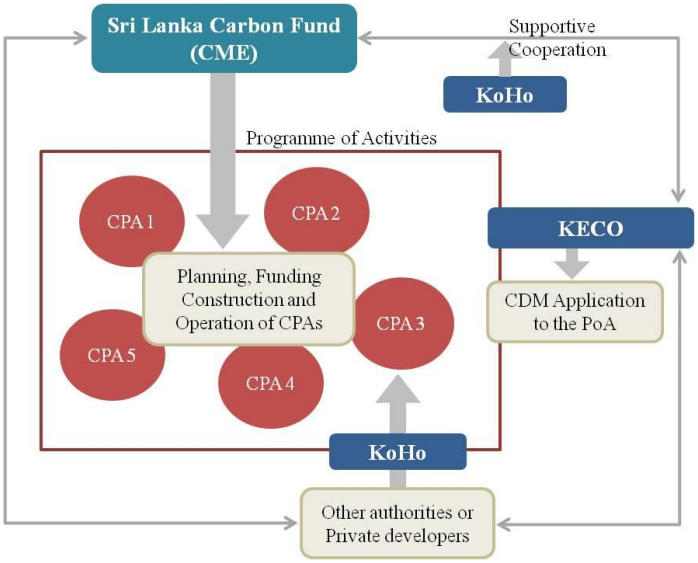
[2] Sri Lanka Carbon Fund (Private.) Limited was established on April 9, 2008 by a Cabinet decision as a private-public partnership company to provide and facilitate technical and financial assistances to the CDM project developers

Currently there is a large potential for small hydropower generation in the country. However, most of these projects that are yet to be developed have faced serious financial and other barriers. Some of the developers have used Clean Development Mechanism (CDM) to improve the financial viability and remove these barriers. However, most small scale hydropower developers find it difficult to use CDM mechanism due to prohibitive cost mainly due to the small size of the project. Therefore the objective of this PoA is to develop programmatic CDM for those small hydropower generation projects which are not viable as a CDM project due to the small size and those have significant emission reduction potential.
This PoA is geographically located in Sri Lanka. The generated electricity will be supplied to the national grid owned by CEB the national utility.

The project participants of this PoA are Sri Lanka Carbon Fund (Pvt.) Ltd. (SLCF) which is a Company incorporated under the Company Act. 07 of 2007 of Sri Lanka, Korean Environment Corporation (KECO)[3], a Public Agency established under the Korea Environment Act. No.9433 of South Korea and Koho Trading & Consultancy (Pvt.) Ltd. (KoHo), a Company incorporated under the Company Act., 07 of 2007 of Sri Lanka. The SLCF has signed a MoU with KECO and KoHo on 13th September 2012 to develop this PoA. Three parties, SLCF and KECO and KoHo will jointly implement this PoA under clearly demarcated responsibilities.

The SLCF will function as CME of this PoA. KECO is responsible for the CDM registration, monitoring and CER issuance and other CDM-related issues. The KoHo will support SLCF for CME activities and the CPA activities.

This PoA will consist of project activities that install a new small hydropower plant where there was no renewable energy power plant operation prior to the implementation of the project activities (Greenfield plant). Private companies or any government or semi government agencies that meet the criteria outlined in this PoA can participate in this PoA as a CPA implementer. The installed capacity of each CPA is less than or equal to 15MW. Therefore, all the entities regardless of whether private or public may be involved in this proposed PoA.



[Figure A.1 General operating and implementing framework of PoA]

[3] It is Korean public agency and the project participant of the proposed program of activities. KECO has been established in order to handle environment-related projects with maximum efficiency. These projects include; pollution prevention, environmental improvement, and resource recirculation.

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

In Sri Lanka there is no mandatory requirement for private sector or government agency to invest in small hydropower projects.

Therefore, this PoA is a voluntary action being coordinated and managed by SLCF and host country approval to this PoA will confirm a voluntary action.

Additionally, as written above, Sri Lanka Government newly establishes the renewable energy tariff policy, *Non-Conventional Renewable Energy (NCRE) Purchase tariff* in 10th June 2008[4] for the purpose of development and diffusion of renewable energy. Before it, Sri Lanka applied other renewable energy policy, *Avoided tariff*. And After 2008, exactly since 2011, NCRE tariff was applied for renewable energy generation in whole Sri Lanka. According to the trend of decided tariff price under the NCRE tariff policy, NCRE tariff is higher than historical Avoided tariff price.

Therefore, by raising the renewable energy generation tariff, Sri Lanka government intend to help to be lower the entry barriers for the small scale renewable energy project.

Contribution to sustainable development

This PoA will promote and sustainability of renewable energy sector in the Country as follows;

- Social/Technological aspects
  - The proposed PoA can diversify sources of electricity generation from using fossil fuels to renewable energy sources especially to small/mini hydro option where the country has a great potential.
  - The proposed PoA will contribute to revitalization of country energy sector and promote participation of private/independent power producers.
  - The proposed PoA will contribute to national energy supply.
- Economical aspects
  - The proposed PoA will encourage investors to use CDM mechanism to make small hydro projects viable.
  - The proposed PoA will create job opportunities, directly and in-directly, through construction and operation of the plant.
  - The plants will improve the local residents' living standard.
- Environmental and National aspects
  - The proposed PoA involves implementation small hydropower project (CPA) to avoid the emissions of Carbon Dioxide to the atmosphere (GHG) from the fossil fuel based power generation that would have otherwise been implemented to supply electricity to the people.
  - The plant will contribute toward improvement of air quality and better living conditions of the country by reducing the air pollution.

[4] According to the EB 52th meeting report, Annex3 (The application of E+/E- Policies in the assessment of additionality), In case of the policies which give comparative advantage to less emission intensive technologies or fuel (E- policy), the impacts of these policies can be excluded in establishing a baseline scenario if they have been implemented since the adoption of the Marrakesh Accords (11/11/2001).

A.3. CMEs and participants of PoA

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(a) CME of the PoA as the entity which communicates with the CDM Executive Board
- Sri Lanka Carbon Fund (Private) Limited., Sri Lanka

(b) Project participants being registered in relation to the PoA. (Project participants may or may not be involved in one of the CPAs related to the PoA)
- Korea Environment Corporation, Republic of Korea
- Koho Trading & Consultancy (Private) Limited., Sri Lanka

A.4. Party(ies)

[Table A.1 Coordinating/managing entity and participants of SSC-POA]

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Sri Lanka (Host country)	• Public entity : Sri Lanka Carbon Fund (Pvt.) Ltd. (CME) (*Private-Public partnership company) • Private entity : Koho Trading & Consultancy (Pvt.) Ltd. (Project participant)	No
Republic of Korea	• Public entity: Korea Environment Corporation (Project participant)	No

A.5. Physical/ Geographical boundary of the PoA

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Geographical boundary of the proposed PoA is the national boundaries of Sri Lanka.
No other host party is included. All SSC-CPAs will be implemented within the Sri Lanka.

[Figure A.2 Geographical Boundary of the PoA]

A.6. Technologies/measures

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A typical CPA will have the following features;

Technology	Small-scale Hydropower technology to generation
Generation Capacity	Each CPA with the total installed capacity will be up to 15MW
Applicability	Only Greenfield project are applicable
Usage of the produced electricity	All the electricity generation from the CPA will be provided to the national grid

PoA will introduce *hydropower generating technologies* contributing for the improvement of environment through reducing emissions such as SO_x and NO_x from thermal power plants in addition to the reduction of CO_2 emission.

All CPAs under the PoA, *potential energy available in the stream* in view of the higher elevation is utilized to drive turbines and discharge the water at a point lower than the water take off point. The intake structure comprising of a weir and a headrace channel and a fore-bay is used to take water from the stream to the powerhouse. The water in the fore-bay is made to drive turbines, which drive alternators to generate electricity. Voltage level of the electricity generated is raised to required level and connected to the national electricity grid through appropriate switchgear and protection systems.

Non-Conventional Renewable Energy (NCRE) tariff was introduced for the purpose of development and diffusion of renewable energy.
NCRE tariff category is classified on the basis of renewable technology type such as mini-hydro-local, mini-hydro, wind-local, wind, biomass (dendro and agricultural & industrial waste), municipal solid waste and waste heat.
At this, in case that CPA introduce the hydro power equipment manufactured by the local company in Sri Lanka, the project can apply the tariff classified as ‘mini-hydro-local’ and if CPA introduce equipment imported from other country, the project should apply the tariff classified as ‘mini-hydro’.

To determine the performance of equipment used in each CPA, CPA implementer shall use the *manufacturer’s specifications*, provided that they are tested and certified. Below table gives the basic parameters of the equipment identified for small scale hydropower project (CPA).

All CPAs for inclusion in the PoA shall apply this technology.

[Figure A.3 generation flow of typical small scale hydropower plant in Sri Lanka]

A.7. Public funding of PoA

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The proposed PoA will not receive any public funds result in the diversion of official development assistance and not be counted towards the financial obligation of Parties included in Annex I.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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In the absence of the PoA, none of the implemented CPAs would occur;

The development of new small hydropower projects which are located in uneconomical areas requires substantial investment. These project activities are not financially attractive to the developers. Therefore, the proposed PoA would not be attractive and implemented without CERs revenues.

As the PoA consists of one or more small-scale projects as CPAs, the additionality is demonstrated at the CPA level using appropriate EB Guidelines for criteria below.

[Table B.1: Checklist for each CPA]

Method		Criteria		Guideline
		Applicability	Capacity	
A	Special Under-developed Zone (SUZ) approval	In the case that the CPA project site is ***included*** SUZ.	up to 5 MW (micro scale)	Guideline: demonstrating additionality of microscale project activities (EB 73, Annex 13, Version 04.0)
B	Investment Analysis	In the case that the CPA project site is ***not included*** SUZ.	up to 15 MW	Guidelines on the demonstration of additionality of small-scale project activities (EB 68, Annex 27, Version 09.0)

B.2. Eligibility criteria for inclusion of a CPA in the PoA

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In the list below, the criteria for enrolling the CPA into the PoA is described.

[Table B.2: Checklist for each CPA]

	classify	Eligibility criteria (Each CPA shall meet the conditions below)	Means of validation/ Evidence
1	Voluntary action	The CPA is a voluntary activity, which is not enforced by any mandatory national/local regulation in Sri Lanka.	- Means of validation : Desk review - Evidence : A.2 of PoA-DD, Part I.
2	Geographical boundary	The CPA is performed within the geographical boundary of Sri Lanka.	- Means of validation : Desk review/On-site visit - Evidence : GPS information
3	Approval of CPA by CME	The CPA signs an agreement with CME to involve the CPA into PoA to ensure that CPA implementer is aware of and agreed to subscribe the CPA into PoA. The agreement between CME and CPA implementer include the de-bundling check, double counting and monitoring issues. (In case that CPA implementer is same with CME, the agreement is not required.)	- Means of validation : Desk review - Evidence : CME-CPA contract
4	De-bundling check	The CPA is not a de-bundled component of a large project activity.	- Means of validation : Desk review/On-site visit - Evidence : A.12 of CPA-DD, CME-CPA contract
5	Avoid Double counting of CPA	The CPA is not involved in another registered or under validation as a CDM project activity or as a CPA under another PoA or as other GHG reduction projects related to small hydropower generation.	- Means of validation : Desk review/On-site visit - Evidence : Certificate of double counting check
6	Technology & Specification	The CPA applies *Run-of-river power generation technology* and if reservoir, power density of the	- Means of validation : Desk review/On-site visit

		project is greater than 4 W/m^2. (The CPA should submit the specification of hydro power generation facility/equipment installed for CPA.)	- Evidence : *manufacturer's specifications* tested and certified by manufacturer
7	Methodology Applicability	The CPA satisfies the applicability conditions for simplified baseline and monitoring methodologies as specified in the AMS I.D (version 17)	- Means of validation : Desk review/On-site visit - Evidence : D.2 of CPA-DD
8	Funding from Annex I parties	The CPA provides an affirmation that funding from Annex I party, if any, does not result in a diversion of official development assistance.	- Means of validation : Desk review - Evidence : evidence including sources of funds (e.g. investment plan)
9	Additionality	The CPA meets the requirements pertaining to demonstration of additionality. To determine the additionality, CPA should follow the process in B.5 of PoA-DD, Part II.	- Means of validation : Desk review - Evidence : D.5 of CPA-DD, (if CPA apply the method B) Investment analysis sheet with evidence for IRR calculation
10	CPA start date	The CPA does not commence prior to the start date of validation for PoA (05/ Feb /2013), in accordance with EB 70th, Annex 2 and has the documentary evidence to check its start date.	- Means of validation : Desk review - Evidence : contract related to the CPA
11	Local stakeholder consultation	The CPA performs local stakeholder consultation before the inclusion in PoA and construction.	- Means of validation : Desk review - Evidence : Minutes, stakeholder consultation reports, etc.
12	Environmental impact analysis	The CPA performs the environmental impacts analysis according to National Environmental Regulation of Sri Lanka.	- Means of validation : Desk review - Evidence : IEE report, IEE approval by CEA, Section B of CPA-DD
13	Project scale threshold	The capacity of hydropower plant do not exceed 15MW over the entire crediting period as small-scale CDM project activities.	- Means of validation : Desk review - Evidence : Emission reduction sheets, (Pre-) Feasibility Study Report

As the CME, SLCF will check potential CPAs and ensure that each CPA meets all eligibility criteria before inclusion in the registered PoA.

Provisions regarding updating eligibility criteria

It is based on "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities, version 02.1 (EB70, Annex5)". Whenever the EB meeting report is issued, CME will check whether the version of AMS-I.D methodology is revised or replaced or not. If the version of the methodology is revised or replaced, CME will follow the process below.

- If the version of the AMS-I.D methodology is revised or replaced, subsequent to being placed on hold, the CME shall update the eligibility criteria according to the requirements of the revised or new methodology immediately. A new version of the PoA-DD and generic CPA-DD including updated eligibility criteria validated by a DOE shall be submitted to the Board for approval.
  (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 CDM-CPA-DD;
  (b) CPAs that were included before the AMS-I.D 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.
- CME will not take the action if the version of the AMS-I.D methodology is revised without being placed on hold or is withdrawn for the purpose of inclusion in a consolidated methodology,

unless otherwise indicated in the respective report of the meeting of the Board that has approved the new methodologies.

B.3. Application of methodologies

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AMS-I.D Ver.17 is applicable for the following reasons:

The PoA involves the development of *small scale hydropower project*.

The baseline scenario of the power generation in the country is the use of high emission thermal power plant to meet the power demand in the country. Regulation does not mandate the developers to generate renewable power. All CPAs in this PoA is small scale as the *installed capacity is lower than 15MW* and if the CPA result in new reservoirs, the *power density of CPA should be greater than 4W/m^2*.

Therefore, All CPAs implemented under this PoA will apply the approved small scale methodology AMS-I.D. "Grid connected renewable electricity generation" (version 17.0).

SECTION C. Management system

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The operation and management of this PoA will be implemented based on *CDM Operation Manual for 'Programme of Activities for Small scale Hydropower CDM in Sri Lanka' (hereinafter 'manual')*. This manual has a purpose for CME to develop various procedures in order to operate this PoA in stable and involves a range of operational activities in order to implement and manage the CPA by CME.

According to the 'Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities, version 02.1 (EB 70, Annex 5)', this manual should involve the following:

a. Roles, Responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their Competencies;
b. Records of arrangements for training and capacity development for personnel;
c. A procedure for technical review of inclusion of CPAs;
d. A procedure to avoid double counting;
e. Records and documentation control process for each CPA under the PoA;
f. Measures for continuous improvements of the PoA management system;
g. Any other relevant elements.

Through Manual, CME implements the management system of each CPAs including environmental and social impact mitigation, baseline and project emission monitoring process, all the data collection, storage and retrieval system.

Since this manual is subject to continuous improvement by CME or CPA implementer's request or due to validation and verification process, its content and possibly even structure can be expected to vary over time. Nevertheless, any changes that a DOE might observe at inclusion of CPAs after validation of the PoA will be documented through the procedure for continuous improvement.

Roles, Responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their Competencies;

Entity	Roles
CME (SLCF)	1. Function as joint focal point on Modalities of Communication Form of the PoA. 2. Support the KECO and KoHo for PoA Registration and verification, communication, etc. with DOE, UNFCCC Secretariat and CDM EB 3. Providing CPA implementers with guidance for proper CDM monitoring activity and other CDM related process 4. General management of monitored parameters of all CPAs 5. Inclusion of new CPAs 6. De-bundling check 7. Double counting check 8. Ensure monitoring plan and establish the monitoring system 9. Verification and storage of monitoring data 10.CERs allocation with CPA implementer according to agreements
KECO	1. Support activities related to CDM application 2. Support establishing PoA operation procedure and system 3. Undertake CDM registration, monitoring, CER issuance and other CDM related issues. 4. Function as joint focal point on Modalities of Communication Form of the PoA 5. Prepare monitoring report
KoHo	1. Support SLCF for CME activities and the CPA activities 2. Support KECO for CDM registration, monitoring, CER issuance and other CDM related issues 3. Function as joint focal point on Modalities of Communication From of the PoA
CPA implementer	1. Construction and operation of the hydropower plant 2. Direct CDM monitoring activity including data recording etc. 3. Installation and management of monitoring equipment including QA/QC activities 4. Report monitoring activity records to CME 5. Demonstrate the additionality of the CPA 6. Record keeping system

In addition, CME will implement the following operational elements to ensure proper management and control of the proposed PoA.

Records of arrangements for training and capacity development for personnel;

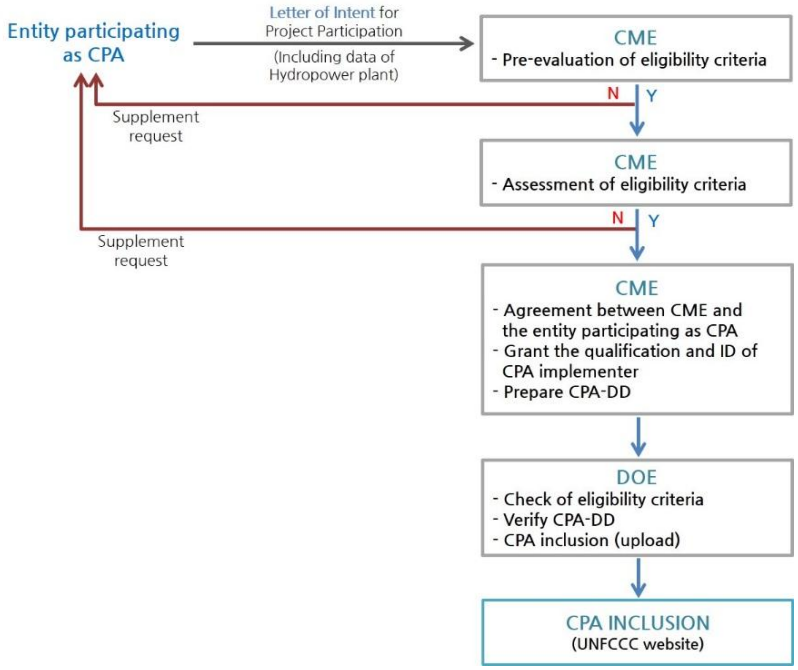
Training programs refer to activities and programs carried out by the CME or outside institute with the goal of maintaining and improving the job performance, qualifications and skills of the employees and managers of CPA implementer. Training contents for effective operation of the PoA are as following.

Department	Contents
Technical/Operation Department	- EB Guidelines and Methodology (AMS-I.D) - CDM Process - Monitoring parameter - Monitoring method and frequency - Calibration - Recording of monitoring data
Management Department	- Reporting of monitoring data - Data collection - Data management - Data storage

A procedure for technical review of inclusion of CPAs;

The flow of CPA inclusion is as follow;

(The detailed procedures for the technical review of inclusion of CPAs has been included in the manual which has been provided to the DOE.)



[Figure C.2: Procedure for inclusion of CPAs]

A procedure to avoid double counting;

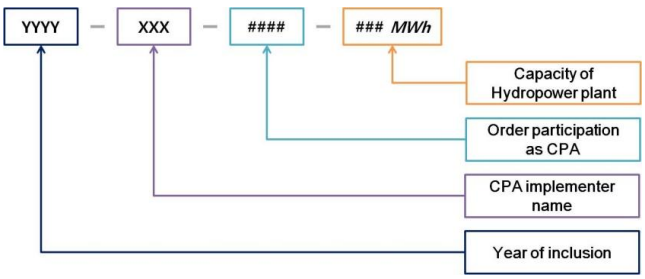
The database described above will be used to perform a double counting check. Every new CPA will be compared to the list of project activities that are under validation or registered at the UNFCCC. Before the inclusion of any CPA the CPA implementer will be made aware of the double counting principle and will be required to certify in writing that proposed CPA is not currently registered under the CDM of UNFCCC or any voluntary scheme nor is currently in the CDM pipeline going through the process of validation or registration.

Therefore, eligibility criteria No. 5 of this PoA provides a strict restriction that will avoid double counting of a new CPA. The criteria are enforced as follows:

- Signed certificate by CPA implementer

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

In order to unambiguously identify each CPA in this PoA, CME will grant CPA implementers with ID number according to the following ID numbering system;



[Figure C.1: I.D. forms of CPA Implementer]

This ID numbering system will be used to record baseline and monitoring data on a continuous basis using a template of CDM Operation Manual with a MS excel database. Each CPA will follow the monitoring requirements stipulated in AMS-I.D, ver.17 and CME will record and document CPA detail information as follows:

- Name, address, details of CPA implementer
- Capacity of hydropower plant
- Geographical coordinates of CPA (GPS information)
- The record of technical specification of each hydropower plant participating in the PoA
- Check if the hydropower plant equipment were transferred from or to another project activity

And CME will develop and maintain an electronic database, which will contain essential data and information about each CPA, including;

i) Technical Document
- Project Design Document (PoA-DD & CPA-DD)
- Validation Report of PoA & CPA
- Documents related to government approval
- Qualification or education certificate of person in charge
- CDM Operational Manual and Procedures
- Monitoring report
- Documents related to eligibility criteria check

ii) Standard Document/Information
- CDM-SSC-PoA-DD
- CDM-SSC-CPA-DD
- AMS I.D, Grid connected renewable electricity generation
- Methodological Tool
- Guidelines and Standards

iii) General Document

General documents are classified into the internal documents such as the minutes or notes of CPA Implementer/CME, and the External documents such as the official notes from government offices, 3rd parties

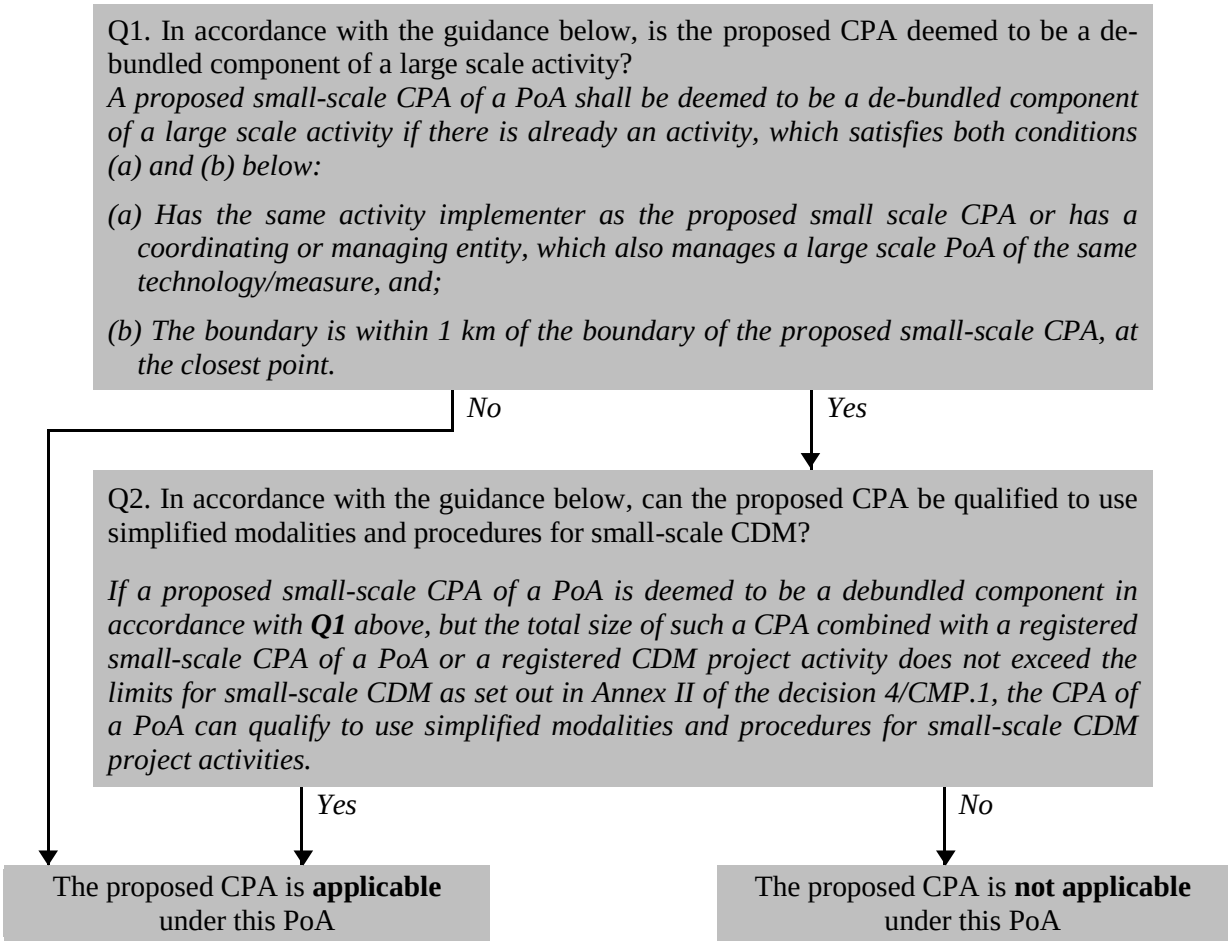
Measures for continuous improvements of the PoA management system;

CME will updates/revises the processes and procedure of manual periodically with a view to improving them for better management system control based on changes incurred from time to time during the operation of the PoA.

Any other relevant elements.

- Procedure to check de-bundled component;

The de-bundling check will be performed based on "Guidelines on assessment of de-bundling for SSC project activities, Version 03 (EB 54, Annex 13). The database described above will be used to perform the de-bundling check. Every new CPA will be compared to the list of project activities that are under validation or registered at the UNFCCC by CME. Before the inclusion of any CPA the CPA implementer will be made aware of the de-bundling rules below.



[Figure C.2: De-bundling check list]

- The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

To ensure that the operators of the CPA are aware of and have agreed that their activity is being subscribed to the PoA, the CPA implementer shall enter into a contractual arrangement with CME including respective provisions that:

- The CPA implementer is aware that the CPA will be subscribed to the present PoA.
- The CPA (has not) is not (and will not) undertaking another hydropower project within 1 km of the proposed CPA.
- The CPA implementer may cede its rights to claim and own emission reductions under the CDM or any voluntary scheme to CME
- The CPA implementer certifies that the CPA is not registered under the CDM of the UNFCCC or any voluntary scheme

Therefore, the acceptance and awareness of each CPA implementer is evidenced through the agreement between CME and CPA implementer before CPA inclusion in the PoA. In case that CPA implementer is same with CME, the agreement is not necessary.

SECTION D. Duration of PoA

D.1. Start date of PoA

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05/02/2013 (5th February 2013)
(Publication date of this Programme of Activities (PoA))

D.2. Length of the PoA

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28 years

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

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The Environmental Analysis will be done at CPA level.
This PoA consists of development of small hydropower generation using run-of-river method in Sri Lanka. As the environmental impact is site-specific, the environmental Analysis will be carried out at the CPA level and reported in each CPA-DD.

E.2. Analysis of the environmental impacts

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The analysis of environmental impacts, including trans-boundary impacts, will be conducted at CPA level.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

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The each CPA operates within a geographically defined region. For this reason local stakeholder consultation is done on a CPA level to ensure that the stakeholders within the region actually affected by the project activity are adequately informed and consulted.

F.2. Summary of comments received

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Comments from local stakeholders will be conducted at CPA level.

F.3. Report on consideration of comments received

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Report on consideration of comments will be conducted at CPA level.

SECTION G. Approval and authorization

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Project has been submitted to DNA for its concurrence.

The certificate was provided to the DOE.

<table>
<tr><td>Host country (Sri Lanka)
Date: 05/08/2013
(No. 04/04/05/921)</td><td>Participant country (Republic of Korea)
Date: 07/06/2013
(No. 2013-01)</td></tr>
<tr><td>පරිසර අමාත්‍යාංශය
சுற்றாடல் அமைச்சு
Ministry of Environment

[illegible]
"Sampathpaya" No. 82, Rajamalwatta Road, Battaramulla, Sri Lanka.
Gen. Tel: +94 - 11 - 2882112 - 3
Secretary +94-11-2877290
Fax +94-11-2877292

My No. 04/04/05/921   No.   Date 05.08.2013

Designated National Authority for CDM in Sri Lanka

Mr. Mahesh Chamara Ariyathilaka
Project Engineer
CDM Department
Sri Lanka Carbon Fund (Pvt.) Ltd.
No.980/4A
Wickramasinghe Place
Ethul Kotte.

Ms. Myungock Hong, Jane
Managing Director
Koho Trading & Consultancy (Private) Limited
25, Skelton Road
Colombo 5.

Dear Sir/Madam,

<u>Host Country Approval for Programme of Activities (PoA)</u>
<u>"Programme of Activities for Small Scale Hydropower CDM in Sri Lanka"</u>

This has reference to the request made by Sri Lanka Carbon Fund (Pvt.) Ltd. as a Coordinating and Management Entity (CME) for the establishment of the Programme of Activities for Small Scale Hydropower CDM in Sri Lanka as a Programme of Activities (PoA).

As authorized representative of the Designated National Authority for the Clean Development Mechanism of Sri Lanka, I hereby confirm that:

1. The government of Sri Lanka has acceded the Kyoto Protocol in September 2002.
2. The proposed project contributes to sustainable development in Sri Lanka.
3. The approval is granted hereby for voluntary participation in the proposed CDM activity.

Thanking you

Yours sincerely,

Anoja Herath
Asst.Director (Climate Change)
For Secretary
M. A. U. K. HERATH
Assistant Director
Climate Change Division

[illegible]
"நாம் வாழும் இந்த பூமி மற்றும் மரம் செடி கொடிகள் மனிதனுக்கு மட்டுமன்றி வான் வெளியில் பறந்து திரியும் பறவைகள் மற்றும் பூமியிலுள்ள விலங்குகளுக்கும் ஏனைய அனைத்து விலங்குகளுக்கும் சொந்தமானது"</td><td>No. 2013- 01

Approval of CDM Project

Sri Lanka Carbon Fund (Private) Ltd (CME)
Managing Director (Mr. B.M.S Batagoda)
No. 980/4A, Wickramasinghe Place, Ethul Kotte, Sri Lanka

Korea Environment Corporation (KECO)
CEO (Mr. Si-Jin Lee)
42, HwanGyeong-Ro, Seo-gu, Incheon, Republic of Korea

In respect of "Programme of Activities for Small Scale Hydropower CDM in Sri Lanka" in which the above-mentioned entity participates, the Government of the Republic of Korea hereby confirms the followings in accordance with the approval decision of the CDM review committee;

i) The Government of Republic of Korea has ratified the Kyoto Protocol in November 2002.

ii) This is approval of voluntary participation in the proposed CDM project activity.

June 7, 2013

Ministry of Trade, Industry & Energy
Yoon, Sang - Jick

Ministry of Land Infrastructure, and Transport
Suh, Seoung - Hwan

THE REPUBLIC OF KOREA</td></tr>
</table>

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

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This CPA is a part of *"**Programme of Activities for Small Scale Hydropower CDM in Sri Lanka**"* (hereafter 'PoA').

This CPA aims to mitigate GHG emissions through renewable energy project using hydropower plant which supplies electricity to Sri Lankan National Grid. This CPA has a significant effect on reducing GHG emissions related to electricity generation by using fossil fuel. The CPA consists of a hydropower plant with the capacity of below or equal to 15MW which is located on the actual location.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

>>

The following methodology and tools will be used in the CPAs.

Methodology

- Sectoral Scope : 1 – Energy industries (renewable / non-renewable sources)
- Methodology : AMS I.D - Grid connected renewable electricity generation (Version 17)
- Project Type : I – Renewable Energy Project
- Project category : D – Grid connected renewable electricity generation

Tool

- Tool to calculate the emission factor for an electrical system (Ver 03.0.0, EB 70, Annex 22)
- Guidelines on the demonstration of additionality of small-scale project activities (Ver 09.0, EB 68, Annex 27)
- Guideline: demonstrating additionality of microscale project activities (Ver 05.0, EB 73, Annex 13)
- Tool to calculate project or leakage CO_2 emission from fossil fuel combustion (Ver 02, EB 41, Annex 11)

B.2. Application of methodology(ies)

>>

AMS-I.D Ver.17 is applicable for the following reasons:

Project Type I is for renewable energy project activities with a maximum output capacity of 15MW (or an appropriate equivalent). Project Category D is for Grid connected generation project activities.

The PoA involves *the development of hydropower project activities* and each CPA under this PoA will have small scale project activities as the *installed capacity is lower than 15MW.*

The baseline scenario of the power generation in the country is the use of high emission thermal power plant to meet the power demand in the country. Regulation does not mandate the developers to generate renewable power. The following list demonstrates the applicability of the typical CPA for this PoA.

[Table B.1: Methodological applicability check of typical CPA]

	Applicability Check of AMS ID Ver.17	CPA justification
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or	**Yes** The project activity comprises renewable energy generation units based on hydro that supply electricity to CEB grid, which

<table>
<tr><td></td><td>(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling</td><td>has been dominated by several fossil fuels, fired generating units.</td></tr>
<tr><td>2</td><td>Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) is given below. Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types
<table>
<tr><th>Project type</th><th>I.A</th><th>I.D</th><th>I.F</th></tr>
<tr><td>Project supplies electricity to a national /regional grid</td><td></td><td>o</td><td></td></tr>
<tr><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)</td><td></td><td></td><td>o</td></tr>
<tr><td>Project supplies electricity to an identified consumer facility via national/ regional grid (through a contractual arrangement such as wheeling)</td><td></td><td>o</td><td></td></tr>
<tr><td>Project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or diesel fuel</td><td></td><td></td><td>o</td></tr>
<tr><td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td><td>o</td><td></td><td></td></tr>
</table></td><td>Yes
The project activity is hydropower plant supplying electricity to the national grid, so AMS I.D is applicable.</td></tr>
<tr><td>3</td><td>This methodology is applicable to project activities that:
(a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);
(b) Involve a capacity addition;
(c) Involve a retrofit of (an) existing plant(s); or
(d) Involve a replacement of (an) existing plant(s).</td><td>Yes
The proposed project involves the installation of new hydropower plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity. (Greenfield plant)</td></tr>
<tr><td>4</td><td>Hydro power plants with reservoirs 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, 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.</td><td>Yes
In case that the project activity result in new reservoirs, the power density should be greater than 4W/m^2.</td></tr>
<tr><td>5</td><td>If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW</td><td>Yes
All CPAs should have power generation less than limit of 15 MW and should not have non-renewable components.</td></tr>
<tr><td>6</td><td>Combined heat and power (co-generation) systems are not eligible under this category.</td><td>Not applicable
Project activity comprises renewable energy generation units based on hydro.</td></tr>
<tr><td>7</td><td>In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.</td><td>Not applicable
Project activity doesn’t involve the addition of renewable energy generation units at an existing renewable power generation facility.</td></tr>
<tr><td>8</td><td>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.</td><td>Not applicable
Project activity doesn’t seek to retrofit or modify an existing facility for renewable energy generation.</td></tr>
</table>

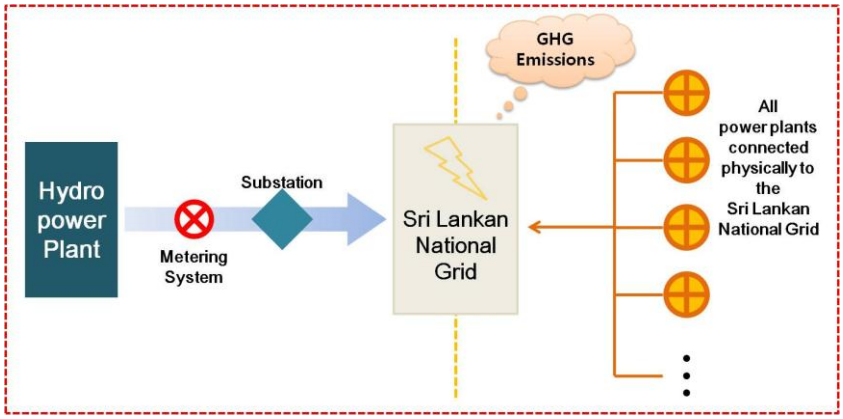
B.3. Sources and GHGs

>>

The extent of CPA boundary based on the AMS- I.D, Ver.17 would be the following;

(a) Where the fossil fuel based power generation would have been emitted CO_2 emission in absence of the CPA;

(b) Where there is a small scale hydro power project using run-of-river technology;



[Figure B.1 Project boundary]

The gases and sources relevant to the CPA are listed below based on the AMS-I.D, Ver.17 methodology.

[Table B.2: Emissions sources within CPA Boundary that are considered]

Source		Gas	Included	Justification / Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants connected into the National Grid of Sri Lanka that are displaced due to the project activity	CO_2	Yes	Main emission sources
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	CH_4 emissions from reservoirs of hydro power plant (In case that the project activities result in new single or multiple reservoirs)	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source
	CO_2 emissions from on-site consumption of fossil fuels due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

B.4. Description of baseline scenario

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The CPA included in PoA involves the generation of electricity from renewable energy and exporting the same to the national grid. As per methodology AMS-I.D (ver.17), the baseline scenario for the proposed project activity will be electricity delivered to the grid which otherwise would have been generated by the operation of grid connected power plants and by the addition of new generation sources to the grid.

The emission resulting from the baseline scenario can be calculated as the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

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

Where:

BE_y	Baseline Emissions in year y (tCO_2)
$EG_{BL, y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2, grid, y}$	CO_2 emission factor of the grid in year y (tCO_2/MWh)

As per paragraph 12 of AMS-I.D, the Emission Factor has to 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 tCO_2e/MWh) 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.

Option (a) was chosen to calculate the emission factor of this PoA and CPAs. The emission coefficient (measured in tCO_2e/MWh) calculated in a transparent and conservative manner as 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". This is being determined in line with paragraph 12(a) of AMS-I.D. Baseline scenario would be equivalent amount of electricity generation by the prevailing generation mix of the regional Grid.

B.5. Demonstration of eligibility for a generic CPA

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This CPA satisfies all the eligibility criteria for inclusion in the PoA.

[Table B.3: CPA eligibility criteria]

	classify	Eligibility criteria (Each CPA shall meet the conditions below)	Means of validation/ Evidence	Check If satisfied
1	Voluntary action	The CPA is a voluntary activity, which is not enforced by any mandatory national/local regulation in Sri Lanka.	- Means of validation : Desk review - Evidence : A.2 of PoA-DD, Part I.	□
2	Geographical boundary	The CPA is performed within the geographical boundary of Sri Lanka.	- Means of validation : Desk review/On-site visit - Evidence : GPS information	□
3	Approval of CPA by CME	The CPA signs an agreement with CME to involve the CPA into PoA to ensure that CPA implementer is aware of and agreed to subscribe the CPA into PoA. The agreement between CME and CPA implementer include the de-bundling check, double counting and monitoring issues. (In case that CPA implementer is same with CME, the agreement is not required.)	- Means of validation : Desk review - Evidence : CME-CPA contract	□
4	De-bundling check	The CPA is not a de-bundled component of a large project activity.	- Means of validation : Desk review/On-site visit - Evidence : A.12 of CPA-DD, CME-CPA contract	□
5	Avoid Double counting of CPA	The CPA is not involved in another registered or under validation as a CDM project activity or as a CPA under another PoA or as other GHG reduction projects related to small hydropower	- Means of validation : Desk review/On-site visit - Evidence : Certificate of double counting check	□

		generation.		
6	Technology & Specification	The CPA applies *Run-of-river power generation technology* and if reservoir, power density of the project is greater than 4 W/m^2. (The CPA should submit the specification of hydro power generation facility/equipment installed for CPA.)	- Means of validation : Desk review/On-site visit - Evidence : *manufacturer's specifications* tested and certified by manufacturer	□
7	Methodology Applicability	The CPA satisfies the applicability conditions for simplified baseline and monitoring methodologies as specified in the AMS I.D (version 17)	- Means of validation : Desk review/On-site visit - Evidence : D.2 of CPA-DD	□
8	Funding from Annex I parties	The CPA provides an affirmation that funding from Annex I party, if any, does not result in a diversion of official development assistance.	- Means of validation : Desk review - Evidence : evidence including sources of funds (e.g. investment plan)	□
9	Additionality	The CPA meets the requirements pertaining to demonstration of additionality. To determine the additionality, CPA should follow the process in B.5 of PoA-DD, Part II.	- Means of validation : Desk review - Evidence : D.5 of CPA-DD, (if CPA apply the method B) Investment analysis sheet with evidence for IRR calculation	□
10	CPA start date	The CPA does not commence prior to the start date of validation for PoA (05/ Feb /2013), in accordance with EB 70th, Annex 2 and has the documentary evidence to check its start date.	- Means of validation : Desk review - Evidence : contract related to the CPA	□
11	Local stakeholder consultation	The CPA performs local stakeholder consultation before the inclusion in PoA and construction.	- Means of validation : Desk review - Evidence : Minutes, stakeholder consultation reports, etc.	□
12	Environmental impact analysis	The CPA performs the environmental impacts analysis according to National Environmental Regulation of Sri Lanka.	- Means of validation : Desk review - Evidence : IEE report, IEE approval by CEA, Section B of CPA-DD	□
13	Project scale threshold	The capacity of hydropower plant do not exceed 15MW over the entire crediting period as small-scale CDM project activities.	- Means of validation : Desk review - Evidence : Emission reduction sheets, (Pre-) Feasibility Study Report	□

Assessment and demonstration of additionality for a typical SSC-CPA

Method A. Specialized Underdevelopment Zone (SUZ) approval

According to the 'Guideline: demonstrating additionality of microscale project activities, version 05.0 (EB 73, Annex 13)', Project activities up to 5 MW that employ hydro power technology in this PoA are additional if the geographic location of the project activity is in a special underdeveloped zone (SUZ) of Sri Lanka.

In this, SUZ mean a region in Sri Lanka (zone, municipality or any other designated official administrative unit) identified by Sri Lanka 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:

(a) The proportion of population with income less than USD 2 per day (PPP) in the region is greater than 50%;

(b) 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;

Sri Lanka DNA is preparing the recommendation of the Sri Lanka SUZ to UNFCCC EB approval.

After SUZ Approval from EB is done, these SUZ in Sri Lanka will be listed on the CDM website. In this case, there is no need for the CPA implementers to provide proofs as indicated above.

Method B. Investment Analysis

According to EB 68, Annex 27, "Guidelines on the demonstration of additionality of small-scale project activities (version 09.0)", project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

In order to prove the additionality, the stepwise approach will be used as follows.

Step 1: Investment barrier analysis

Step 2: Technological barrier analysis

Step 3: Barrier due to prevailing practice analysis

Step 4: Other barriers analysis

In this PoA, ***Investment barrier analysis*** will be used.

For demonstrating the investment analysis, Step 2 of "Tool for the demonstration and assessment of additionality (version 07.0.0)" is used by each CPA.

There are three analysis methods available.

1) Simple cost analysis (Option I);

2) Investment comparison analysis (Option II);

3) Bench mark analysis (Option III).

As the project generates financial benefits other than CDM-related income, benchmark analysis (Option III) will be used by each CPA to demonstrate additionality.

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

The following criteria are established for assessing additionality of a CPA.

[Table B.4: Key criteria for assessing additionality of a CPA]

No	Criteria for assessing additionality of a CPA
1	The CPA demonstrates its additionality by investment analysis.

- ***Pre-tax Project IRR Calculation***

The project IRR will be determined based on a list of economic parameters provided by the project participant and this list of parameters includes:

[Table B.5: Parameters for IRR calculation]

Parameter	Unit	Value	Source
Total Project Cost	LKR Mn		
O&M Costs	LKR Mn/year		
Annual Estimated Electricity Generation	MWh/year		
Electricity Tariff	LKR/kWh		
Technical lifetime	years		
Benchmark	%		

The above parameters may be fixed in each CPA by project participant. The investment analysis sheet format considering the situation is included in Excel database.

- ***Determination of Input values***

The input values for project IRR calculation will be valid and applicable at the time of investment decision. As for the time of investment decision, the date is based on the source of funds for project implementation. Therefore, the date of the investment decision may vary for the CPA.

Investment costs may involve the power plant construction, utility installations (e.g. electricity, water, etc) and the equipment purchase, etc. Components associated with power plant construction cost are preliminary works, sub and super structure works, masonry works etc.

O&M costs may involve wages of supervisors and other staffs, site service fees, costs of fuel & lubricants use for the equipment operation, etc. Benefits in the power plant result from annual power generation and sale of electricity during the project period.

- ***Selection of Benchmark***

In conformity with the Clause 12 of the "Guidelines on the Assessment of Investment Analysis (Ver. 05)", which *allows Local Commercial Lending Rates as suitable benchmark for Project IRR,* the benchmark is set as the average value in latest one year available of Average Weighted Lending Rate, issued by Central Bank of Sri Lanka[5] at the time of investment decision.

- ***Sensitivity Analysis***

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

The sensitivity analysis will be conducted using assumptions that are conservative from the point of view of analysing additionality, i.e. the conditions for the project IRR calculation were assumed by altering the following parameters:

a. Total Project Cost
b. Electricity Generation
c. Electricity Tariff

Sensitivity analysis will be performed with variation up to ±10%. The full results of each sensitivity analysis will be reported in the respective SSC CPA-DD using the following format:

[**Table B.6: Results of sensitivity analysis]**

	Variation	**Value**	**Project IRR**	**Benchmark**
Total Project Cost (LKR Mn)	-10%			
	Base Case (0%)			
	10%			
Electricity Generation (kWh)	-10%			
	Base Case (0%)			
	10%			
Electricity Tariff (LKR/kWh)	-10%			
	Base Case (0%)			
	10%			

If the project IRR exceeds the benchmark while altering one of the three parameters, the CPA implementer shall provide evidence that this scenario is unlikely to occur. If no sufficient proof is provided, the CPA will be considered as non-additional.

In conclusion, if the SSC-CPA satisfies the above key criteria, the CPA is additional.

[5] http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&Mode=2&Page=5

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

>>

The emission reductions caused by the proposed hydropower projects of this PoA are calculated according to the approved methodology AMS- I.D, Ver.17.

Typical CPA use run-of-river hydropower generation technology to produce power and to displace fossil fuel based power that avoids emissions of such thermal power plant. The CPA boundary is the spatial extent of the project boundary including the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to the plant.

In the calculation of emission reductions of a CPA, methodological tools and other approved SSC methodologies may be referred as follows;

The *methodology* followed in the PoA-DD is "AMS-I.D Approved methodology for Small Scale Projects" under the sectoral scope "Grid connected renewable electricity generation" which is most appropriate for this project. The applicable methodology, project type and the category are given below.

- Sectoral Scope : 1 – Energy industries (renewable / non-renewable sources)
- Methodology : AMS-I.D - Grid connected renewable electricity generation
- Project Type : I – Renewable Energy Project (Small Scale)
- Project category : D – Grid connected renewable electricity generation

Tools referred to above methodology are:

[Table B.7 Referred tool for ER calculation]

No	Name	Calculated parameter	Purpose of reference
1	Tool to calculate the emission factor for an electrical system (ver 03.0.0)	$EF_{grid,CM,y}$	Calculation of Baseline emissions
2	Tool to calculate project and leakage CO_2 emission from fossil fuel combustion (ver 02)	$PE_{FC,i,j,y}$	Calculation of Project emissions

There may be revisions of the tools above and the CPAs added after the PoA registration may be based on the latest version of these tools (i.e. each CPA may reflect the latest version of the tools). In addition, there are options available in the tools for the project participants to reflect the circumstance of each project activity in the calculation (e.g. default values of the tools applicable under this PoA). Therefore, a CPA implementer can choose any option that is most suitable for that CPA and specify it in the CPA-DD.

Each CPA in this PoA generate small scale, run-of-river hydropower plant, with maximum installed capacity below 15MW that displaces fossil fuel fired electricity generation from thermal power plant to the National Grid of Sri Lanka. This fulfills the requirement for applying methodology AMS-I.D (Ver 17) for CDM small-scale projects. This section explains the procedure used for the calculation of emission reductions including baseline emission, project emission and leakage emission in terms of AMS-I.D.

As per the methodology AMS-I.D, the emission reduction of this PoA was calculated using following procedure.

(1) Baseline Emission (BE_y)

As per the guidance provided in AMS-I.D (Ver.17) for this project the baseline emissions are the product of electrical energy baseline $EG_{Bl,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor as;

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

where;

BE_y	Baseline Emission in year y (tCO_2)
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year y (tCO2/MWh)

Calculation of baseline emission factor ($EF_{CO2,grid,y}$)

In accordance with the "Tool to calculate the emission factor for an electricity system, Version 03.0.0" base line emission factor can be calculated as:

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

(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Of these two options, ***option A*** was used to calculate the baseline emission factor using Combined Margin (CM) and Operating Margin (OM) emission factor using following steps.

STEP 1. Identify the relevant electric power system

In Sri Lanka there is only one electricity transmission and distribution system which is owned and operated by state owned utility known as ***Ceylon Electricity Board (CEB)***. Each CPA in this PoA-DD will be connected to this network. Therefore for this analysis CEB electric power system was used.

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

Option 1: Only grid power plants are included in the calculation

Option 2: Both grid power plants and off-grid power plants are included in the calculation

In Sri Lanka, off-grid power plants are not significant and therefore, ***Option 1*** is used in the calculation.

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

The operating margin emission factor ($EF_{grid,OM,y}$) can be calculated 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.

Of these, the Simple Operating Margin method can only be used where low-cost/must run resources constitute less than 50% of total grid generation in

1) Average of the five most recent years, or

2) Based on long term normal for hydroelectricity production.

As shown in the below table, the low-cost/must run power plant in Sri Lanka constitute only 45.32% of total grid connected power generation (taking as an average of power generation of five most recent years). Since low-cost/must run power plants contributes less than 50% of the total power generation in the country, simple OM method can be elected for the calculation of Operating Margin emission factor as demonstrated by following equation.

$$G = \frac{\sum Genlc_{j,y}}{\sum Gen_y}$$

Where;

$Genlc_{j,y}$ Generation of the low-cost/must run plant for the five most recent years (GWh)

Gen_y Total generation for the five most recent years (GWh)

[Reference] Generation over the five most recent years for which data are available

Source	Year					Total
	2007	2008	2009	2010	2011	
Total Power Generation	9,815	9,901	9,883	10,714	11,529	51,842
Total Thermal Power Generation	5,865	5,763	5,975	4,994	5,748	28,345
Total low-cost/must run Power Generation	3,950	4,138	3,908	5,720	5,781	23,497

Source: Statistical Digest 2007-2011

Low-cost/must run plant ratio (%)

$$= \frac{23,497}{51,842} \times 100$$

$$= 45.32\ \%$$

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CPA-DD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period; or

Ex post option: The year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required calculating the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year (y-1) may be used.

In this project, the Simple OM has been calculated ***EX-ANTE***, using the data vintages for years y, as the full generation-weighted average for the most recent 3 years for which data are available at the time of CPA-DD submission.

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

(a) Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emission per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

It may be calculated:

Option A **:** Based on the net electricity generation and a CO_2 emission factor of each power unit or

Option B **:** Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

In this project ***Option A*** is used to calculate the simple OM emission factor based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OM\ simple,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where;

$EF_{grid,OMsimple,y}$ Simple operating 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	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

In order to calculate the emission factor of each power unit *m* three options can be used under option A. In the power unit *m* only data on electricity generation and the fuel types used is available, 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 under the Option A1, as follows;

$$\boldsymbol{EF_{El,m,y} = \frac{\sum_i FC_{i,m,y} * NCV_{i,y} * EF_{CO_2,i,y}}{EG_{m,y}}}$$

Where;

$FE_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fuel type *I* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m	All power units serving the grid in year *y* except low-cost/must-run power units
i	All fuel types combusted in power unit *m* in year *y*
y	The relevant year as per the data vintage chosen in Step 3

In this step, the calculation was made for years 2009, 2010, 2011 with the thermal plant connected to the grid in the particular year and then the Operating margin emission factor is calculated as the full generation-weighted average for the most recent 3 years for which data are available at the time of CPA-DD submission.

Calculation of the 3 year average of the Operating Margin Emission Factor

The Operating margin emission factor is calculated as the full generation-weighted average for the most recent 3 years for which data are available at the time of CPA-DD submission (ex- ante option).

$$EF_{grid,simple,om} = \frac{(\sum EG_{j,2009} * EF_{grid,sim,om,2009} + \sum EG_{j,2010} * EF_{grid,sim,om,2010} + \sum EG_{j,2011} * EF_{grid,sim,om,2011})}{(\sum EG_{j,2009} + \sum EG_{j,2010} + \sum EG_{j,2011})}$$

Where,

$EF_{grid,simple,om}$	Operating Margin
$EF_{grid,sim,om,2009}$	Operating Margin emission factor for 2009
$EF_{grid,sim,om,2010}$	Operating Margin emission factor for 2010
$EF_{grid,sim,om,2011}$	Operating Margin emission factor for 2011
$\sum Gen_{j,2009}$	total generation of the plant j in 2009
$\sum Gen_{j,2010}$	total generation of the plant j in 2010
$\sum Gen_{j,2011}$	total generation of the plant j in 2011

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 CPA-DD 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.

Option 1 has been chosen for the calculation of Build Margin (BM) in this PoA-DD

From the sample group, the build margin weighted average was calculated based on the equation detailed bellow;

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

Where;

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which 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 in step 4(a) for the simple OM, using options A1 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.

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

The combined margin emissions factor is calculated as follows:

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

Where:

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

The following default values should be used for w_{OM} and w_{BM}:

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.
- All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Using the tool "Tool to calculate the emission factor for an electricity system" with reference data from 'Sales and Generation data book (issued by CEB)', Sustainable Energy Authority in Sri Lanka calculated 2011 grid emission factor[6].

*$EF_{grid,CM,y}$ calculated as **0.7268 tCO_2e/MWh** (see 'Appendix 4' for more details)*

(2) Project Emissions (PE_y):

For most renewable energy project activities, *$PE_y = 0\ tCO_2/y$*

- However, for hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows:

(a) If the power density of the single or multiple reservoirs (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

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

Where,

$PE_{HP,y}$	Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res}	Default emission factor for emissions from reservoirs of hydro power plants in year y ($kgCO_2e/MWh$)
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in tear y (MWh)

(b) If the power density of the project activity (PD) is greater than 10 W/m^2:

$$PE_{HP,y} = 0$$

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

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

Where,

PD	Power density of project activity (W/m^2)
Cap_{PJ}	Installed capacity of the hydro power plant after 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 single or multiple reservoirs 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 single or multiple reservoirs 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.

- And, CO_2 emission from on-site consumption of fossil fuels due to the project activity, it shall be calculated using the latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

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:

[6] http://www.energy.gow.lk/sub_pgs/elibrary_spe_pub.html

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

Where,

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,j,y}$	Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	Fuel types combusted in process j during the year y

At this formula, 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,

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

(3) Leakage Emissions (LE_y):

As per category AMS-I.D (Version 17), leakage is to be considered only if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity.

Since this will not apply for the proposed PoA and all CPAs, there will be no leakage associated with the project activity and therefore, leakage is zero. $LE_y = 0\ tCO_2/y$

(4) Emission Reductions (ER_y):

$$ER_y = BE_y - PE_y - LE_y$$

where;

ER_y	Emission reduction in year y (tCO_2/y)
BE_y	Baseline emission in year y (tCO_2/y)
PE_y	Project emission in year y (tCO_2/y)
LE_y	Leakage emission year y (tCO_2/y)

B.6.2. Data and parameters that are to be reported ex-ante

Emission Factor

Data / Parameter	$EF_{grid,OM,simple,y}$
Unit	tCO_2/MWh
Description	Operating Margin emission factor
Source of data	Calculated
Value(s) applied	0.7044
Choice of data or Measurement methods and procedures	Sri Lanka Sustainable energy authority, government for environmental issue, calculate the emission factor every year and open the value to public. [Reference] http://www.energy.gov.lk/sub_pgs/elibrary_spe_pub.html
Purpose of data	Calculation of baseline emissions
Additional comment	- This data was calculated by SEA at the latest time of PoA-DD submission - This value will be applied during the crediting period without update.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build Margin emission factor
Source of data	Calculated
Value(s) applied	0.7491
Choice of data or Measurement methods and procedures	Sri Lanka Sustainable energy authority, government for environmental issue, calculate the emission factor every year and open the value to public. [Reference] http://www.energy.gov.lk/sub_pgs/elibrary_spe_pub.html
Purpose of data	Calculation of baseline emissions
Additional comment	- This data was calculated by SEA at the latest time of PoA-DD submission - This value will be applied during the crediting period without update.

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin emission factor
Source of data	Calculated
Value(s) applied	0.7268
Choice of data or Measurement methods and procedures	Sri Lanka Sustainable energy authority, government for environmental issue, calculate the emission factor every year and open the value to public. [Reference] http://www.energy.gov.lk/sub_pgs/elibrary_spe_pub.html
Purpose of data	Calculation of baseline emissions
Additional comment	- This data was calculated by SEA at the latest time of PoA-DD submission - This value will be applied during the crediting period without update.

Hydropower project (Power Density)

Data / Parameter	EF_{Res}
Unit	$kgCO_2e/MWh$
Description	Default emission factor for emissions from reservoirs
Source of data	Decision by EB23
Value(s) applied	90
Choice of data or Measurement methods and procedures	Decision by EB23
Purpose of data	Calculation of project emissions
Additional comment	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

Data / Parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data	The data provided by project participant
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Choice of data or Measurement methods and procedures	Determine the installed capacity based on recognized standards If CPA is a greenfield project, this value does not exist prior to the implementation of the project activity. (For new hydro power plants, this value is zero)
Purpose of data	Calculation of project emissions
Additional comment	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

Data / Parameter	A_{BL}
Unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full
Source of data	The data provided by project participant
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Choice of data or Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc. If CPA is a green-field project, this value does not exist prior to the implementation of the project activity. (For new reservoirs, this value is zero)
Purpose of data	Calculation of project emissions
Additional comment	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

B.6.3. Ex-ante calculations of emission reductions

>>

(1) Baseline Emission (BE_y)

As per the guidance provided in AMS I.D Version 17 (point 11) for this project the baseline emissions are the product of electrical energy baseline $EG_{Bl,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor as;

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

where;

BE_y	Baseline Emission in year y (tCO_2)
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activitiy in year y (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year y (tCO2/MWh)

Ex-ante calculation of baseline emissions, $EG_{BL,y}$ is estimated as follows :

$* EG_{BL,y}$ = ***XXXX** MW * **[Plant Load Factor]** * 365 days/yr * 24 hours/day*
= ***XXXX** MWh/yr*

$* BE_y$ = ***XXXX** MWh/yr * 0.7268 tCO_2/MWh*
= ***XXXX** tCO_2/yr*

(2) Project Emissions (PE_y):

For most renewable energy project activities, $PE_y = 0\ tCO_2/y$

- However, for hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows:

(a) If the power density of the single or multiple reservoirs (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

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

Where,

$PE_{HP,y}$	Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res}	Default emission factor for emissions from reservoirs of hydro power plants in year y ($kgCO_2e$/MWh)
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in tear y (MWh)

(b) If the power density of the project activity (PD) is greater than 10 W/m^2:

$$PE_{HP,y} = 0$$

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

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

Where,

PD	Power density of project activity (W/m^2)
Cap_{PJ}	Installed capacity of the hydro power plant after 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 single or multiple reservoirs 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 single or multiple reservoirs 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.

- If CO_2 will be emitted from on-site consumption of fossil fuels due to the project activity, it shall be calculated using the latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

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:

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

Where,

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,j,y}$	Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)
$COEF_{i,y}$	CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	Fuel types combusted in process j during the year y

Ex-ante calculation of project emissions, $PE_{FC,i,j,y}$ ***is assumed as Zero.***

(3) Leakage Emissions (LE_y):

As per category AMS I.D (Ver 17), leakage is to be considered only if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. Since this does not apply for the project activity, there is no leakage associated with the project activity and therefore, leakage is zero. ($LE_y = 0$)

(4) Emission Reduction (ER_y)

$$ER_y = BE_y - PE_y - LE_y$$

where;

ER_y	Emission reduction in year y (tCO_2/y)
BE_y	Baseline emission in year y (tCO_2/y)
PE_y	Project emission in year y (tCO_2/y)
LE_y	Leakage emission year y (tCO_2/y)

Since there are no project emissions and leakage emissions, the emission reductions by the project activity are given by the following formula; ***ERy = BEy***

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter	$EG_{BL,y}$
Unit	MWh
Description	The quantity of net electricity supplied to the national grid by the CPA in year y
Source of data	Measured by electricity meters
Value(s) applied	-
Measurement methods and procedures	The net electricity supplied by the CPA to the national grid is calculated as the difference between Export and the import readings from the electricity meter. The electricity exported and electricity imported will be measured once every month using electricity meter at grid interconnection point
Monitoring frequency	Monthly
QA/QC procedures	- Calibration frequency: According to manufacturer specifications or national standards. and calibration shall be carried out by an accredited person or institution.
Purpose of data	Calculation of baseline emission
Additional comments	- Data will be at least recorded monthly and aggregated yearly. - Data will be kept at least for two years after the end of the last crediting period.

Data / Parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data	The data provided by project participant
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	Determine the installed capacity based on recognized standards
Monitoring frequency	Yearly.
QA/QC procedures	Installed capacity of the power plant will be checked by DOE during verification on-site visit.
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

Data / Parameter	A_{BL}
Unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full
Source of data	The data provided by project participant
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

Data / Parameter	TEG_y
Unit	MWh
Description	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y
Source of data	Project activity site
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	Electricity meters
Monitoring frequency	Monthly
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA result in new single or multiple reservoirs or result in the increase of single or multiple existing reservoirs

Data / Parameter	$FC_{i,j,y}$
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	CPA On-site measurements
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	• 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 piezoelectric 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.
Monitoring frequency	Continuously
QA/QC procedures	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.
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA consume fossil fuels due to the project activity

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)
Description	Weighted average net calorific value of fuel type i in year y
Source of data	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.
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	-
Monitoring frequency	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA consume fossil fuels due to the project activity

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	Weighted average CO_2 emission factor of fuel type i in year y
Source of data	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.
Value(s) applied	To be filled by CPA (applied value is depend on each CPA)
Measurement methods and procedures	-
Monitoring frequency	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	In case that CPA consume fossil fuels due to the project activity

B.7.2. Description of the monitoring plan for a generic CPA

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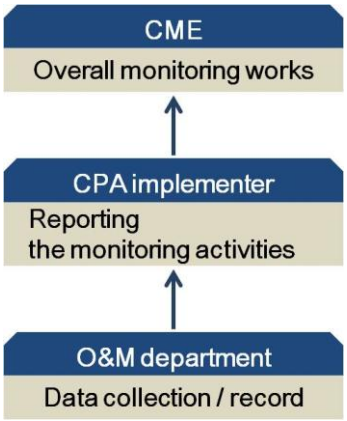
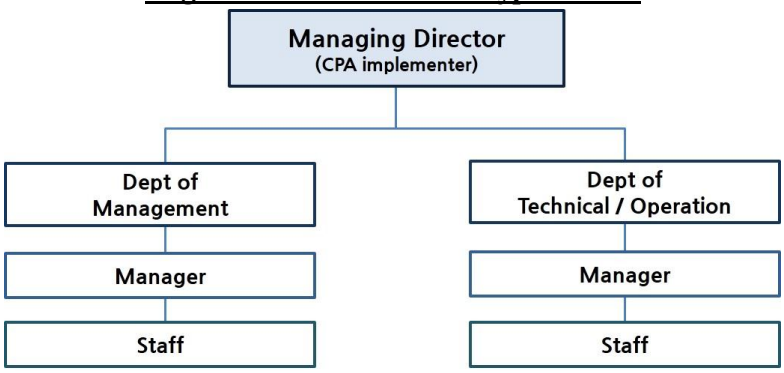
The operational and management structure for monitoring will be designated by each CPA. O&M department of each CPA will be responsible for monitoring data. Each CPA provides CME with the monitoring data.



[Figure B.2 Monitoring structure]

Organization Structure of Typical CPA



Data Collection and Storage

Monitoring and its recording activity will be implemented by each CPA implementer.

All the data collected by the monitoring activity of each CPA will be manually documented or electronically saved. The collected data is saved as computer file at least once a month. All the data collected will be available two years after the end of the crediting period of a CPA.

The monitoring activity includes QA/QC procedures for each parameter. For the stable CDM monitoring activity, the specific procedure will be available in CDM Operation Manual.

Training

Each CPA implementer is required to organize training for its staff that will operate and maintain the power plant facility. The training includes maintenance, repair, overhaul, etc for CDM activity and will be usually organized in collaboration with the machine suppliers and KECO and KoHo. The person in charge of monitoring will be trained according to the CDM Operation Manual.

Operational and Monitoring Obligations

Procedures for CPA monitoring activities are specified in a CDM Operation Manual which will be prepared before the start of the first crediting period and will be tested during startup of the components of the PoA. This will provide an opportunity to correct any deficiencies and further refine the monitoring and recording procedures. It may also provide an opportunity to train operating personnel for the strict requirements for accuracy in collecting and recording data for CDM purposes.

Quality Assurance and Quality Control

The quality assurance and quality control system for recording, maintaining and archiving data shall be maintained by each SSC-CPA. In order to maintain and upgrade the capability and skill of the operator, training related to maintenance of data and information related to power generation will be performed.

Prior to the operation of the project, trainings are to be conducted for each of SSC-CPA personnel in order to ensure that the persons in charged are competent in performing their duties.

The monitoring equipment should be calibrated either in accordance with the *local/national standards*, or as per the *manufacturer's specification*.

Contingency Plan

In case of measurement equipment trouble or data transferring error, the person in charge of monitoring is responsible for prompt grasping the problem and restoring it in due course. Also the person will comply with CDM Operation Manual.

☞ ***Monitoring System stated above is just prepared to apply to typical CPA, but each CPA has their own characteristic and different project situation. Therefore, Monitoring system can be changed depending on each CPA with the main articles. (i.e., Data collection and Storage, Training, Operational and monitoring obligations, QA/QC, Contingency plan)***

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Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	Sri Lanka Carbon Fund (Pvt.) Ltd.
Street/P.O. Box	No. 980/4A, Wickramasinghe Place
Building	
City	Ethul Kotte
State/Region	
Postcode	
Country	Sri Lanka
Telephone	+94 11 2053065
Fax	+94 11 2053065
E-mail	info@carbonfund.lk
Website	www.carbonfund.lk
Contact person	
Title	Managing Director
Salutation	Mr.
Last name	Batagoda
Middle name	
First name	Suren
Department	
Mobile	
Direct fax	+94 11 2053065
Direct tel.	+94 11 2053065
Personal e-mail	info@carbonfund.lk

Organization	Sri Lanka Carbon Fund (Pvt.) Ltd.
Street/P.O. Box	No. 980/4A, Wickramasinghe Place
Building	
City	Ethul Kotte
State/Region	
Postcode	
Country	Sri Lanka
Telephone	+94 11 2053065
Fax	+94 11 2053065
E-mail	info@carbonfund.lk
Website	www.carbonfund.lk
Contact person	
Title	Project Engineer
Salutation	Mr.
Last name	Ariyathilaka
Middle name	Chamara
First name	Mahesh
Department	CDM Department
Mobile	+94 71 5512069
Direct fax	+94 11 2053065
Direct tel.	+94 11 2053065
Personal e-mail	chamara@carbonfund.lk

Organization	Korea Environment Corporation
Street/P.O. Box	42, HwanGyeong-Ro
Building	
City	Seo-gu
State/Region	Incheon
Postcode	404-708
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Appendix 2: Affirmation regarding public funding

This PoA ensures that public funding for a CPA(s) from Annex I Parties, if any, is not to result in the diversion of official development assistance (ODA) and is to be separate from and not counted towards the financial obligations of Annex I Parties.

Appendix 3: Application of methodology(ies)

- Type: Type I – Renewable Energy Projects
- Methodology: AMS-I.D. Grid Connected renewable electricity generation
- Version: Version 17
- Sectoral scope: 01

[Table, Appendix 3-1. Methodological applicability check of typical CPA]

	Applicability Check of AMS ID Ver.17	Proposed PoA
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling	The project activity comprises renewable energy generation units based on hydro that supply electricity to CEB grid, which has been dominated by several fossil fuels, fired generating units.
2	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) is given below. Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types	The project activity is hydropower plant supplying electricity to the national grid, so AMS I.D is applicable.
3	This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renew-able 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).	The proposed project involves the installation of new hydropower plant at a site where there was no renew-able energy power plant operating prior to the implementation of the project activity.(Greenfield plant)
4	Hydro power plants with reservoirs 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, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2; - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	In case that the project activity result in new reservoirs, the power density should be greater than 4W/m^2.
5	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW	All CPAs should have power generation less than limit of 15 MW and should not have non renewable components.
6	Combined heat and power (co-generation) systems are not eligible under this category.	Project activity comprises renewable energy generation units based on hydro.
7	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Project activity doesn't involve the addition of renewable energy generation units at an existing renewable power generation facility.
8	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.	Project activity doesn't seek to retrofit or modify an existing facility for renewable energy generation.

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

(1) Calculation of Grid Emission Factor

(a) Step 3; select a method to determine the operating margin (OM)

Source	Year					Total
	2007	2008	2009	2010	2011	
Total Power Generation	9,815	9,901	9,883	10,714	11,529	51,842
Total Thermal Power Generation	5,865	5,763	5,975	4,994	5,748	28,345
Total low-cost/must run Power Generation	3,950	4,138	3,908	5,720	5,781	23,497

Low-cost/must run plant ratio (%)

$$= \frac{23,497}{51,842} \times 100$$

= 45.32 %

(b) Step 4; calculate the operating margin emission factor according to the selected method

Year	2009	2010	2011
Emissions from Power Plants (tCO_2)	4,038,436.27	3,333,783.67	3,995,667.59
Net Electricity Generation (GWh)	5,789.85	4,798.06	5,543.08
Simple operating margin CO_2 emission factor (tCO_2/MWh)			
Annual	0.6975	0.6948	0.7208
Three-year weighted average	**0.7044**		

(c) Step 5; calculate the build margin (BM) emission factor

Year	2009	2010	2011
Emission of power plants considered for the BM (tCO2)	1,239,261.32	1,229,927.98	1,757,888.35
Generation of power plants considered for the BM (GWh)	2,038.09	2,164.02	2,346.61
Build margin emission factor	**0.6081**	**0.5684**	**0.7491**

(d) Step 6; calculate the combined margin (CM) Emission Factor:

Combined Margin	Weighting factor		Weighted Margin (tCO_2/MWh)
	W_{OM}	W_{BM}	
For solar, wind Projects	0.75	0.25	0.7156
All other Projects;			
1st crediting period	**0.5**	**0.5**	**0.7268**
2nd - 3rd crediting period	0.25	0.75	0.7379

Appendix 5: Further background information on the monitoring plan

N/A

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