Programme of activities design document form

(Version 09.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the PoA	Programme of Activities for Small Scale Hydropower CDM in Sri Lanka
Version number of the PoA-DD	~~3~~5.0
Completion date of the PoA-DD	30/10/2019~~06/08/2013~~
Coordinating/managing entity	Sri Lanka ~~Carbon~~ Climate Fund (Private) Limited
Host Parties	Sri Lanka
Applied methodologies and standardized baselines	AMS-I.D Grid connected renewable electricity generation (Version 18.0)
Sectoral scopes	Sectoral Scope : 1 – Energy industries (renewable / non-renewable sources)

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

>>

Policy/measure or stated goal of the PoA

Sri Lanka is heavily dependent on fossil fuels to meet its annual energy demand. According to Ceylon Electricity Board (CEB), the consumption of fossil fuels in the power sector gradually increases with growing demand for coal. Since coal is identified as an economically attractive fuel option for electricity generation in Sri Lanka, coal energy share is expected to increase to 40% by 2020 and 62% by 2034 to cater the national demand[1]. Country's high dependence on fossil fuels will consequently increase its greenhouse gas (GHG) emissions.

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[2].

In the renewable energy sector, small hydropower generation has great potential. Sri Lanka has large number of small scale hydropower projects located 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~~ Climate Fund (Private) Limited (SLCF)[3] 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.

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.

[1] Ceylon Electricity Board, Long Term Generation Expansion Plan 2018-2037

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

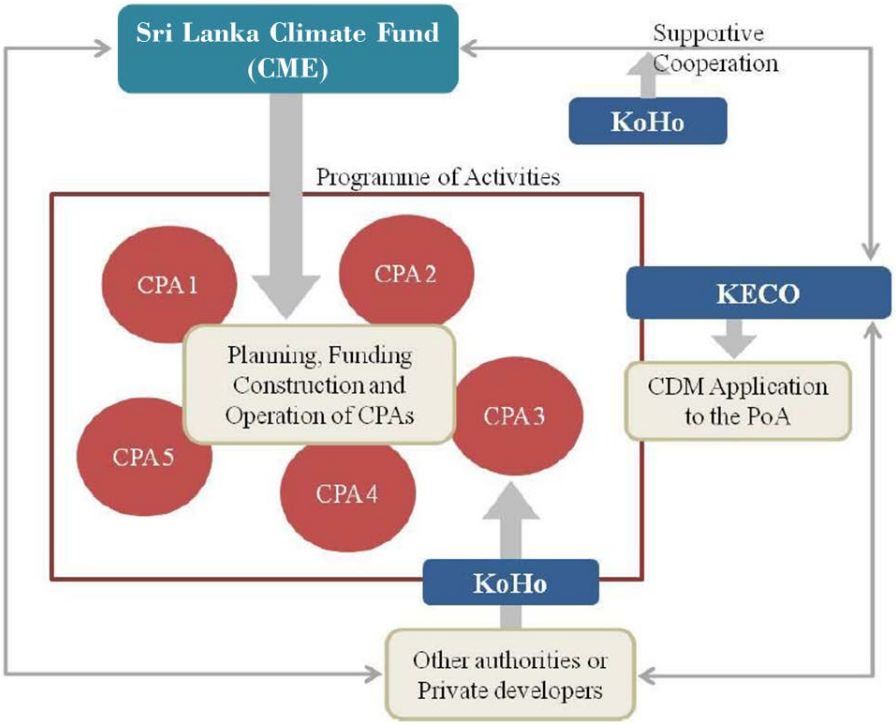
[3] The name of the CME is changed from 'Sri Lanka Carbon Fund' to 'Sri Lanka ~~Carbon~~ Climate Fund in 2016. Sri Lanka ~~Carbon~~Climate Fund (Private) Limited was established on April 9, 2008 by a Cabinet decision as a private-public partnership company to provide and facilitate technical and financial assistances to the CDM project developers.

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~~Climate Fund (Private) Limited (SLCF) which is a Company incorporated under the Company Act. 07 of 2007 of Sri Lanka, Korean Environment Corporation (KECO)[4], a Public Agency established under the Korea Environment Act. No.9433 of South Korea and Koho Trading & Consultancy (Private) Limited (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]

[4] 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 have confirmed a voluntary action.

Additionally, as written above, Sri Lanka Government newly established the renewable energy tariff policy, Non-Conventional Renewable Energy (NCRE) Purchase tariff in 10th June 2008 for the purpose of development and diffusion of renewable energy. Before it, Sri Lanka applied other renewable energy policy named 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 intends to help lower the entry barriers for the small scale renewable energy projects.

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.

A.2. Physical/geographical boundary of PoA

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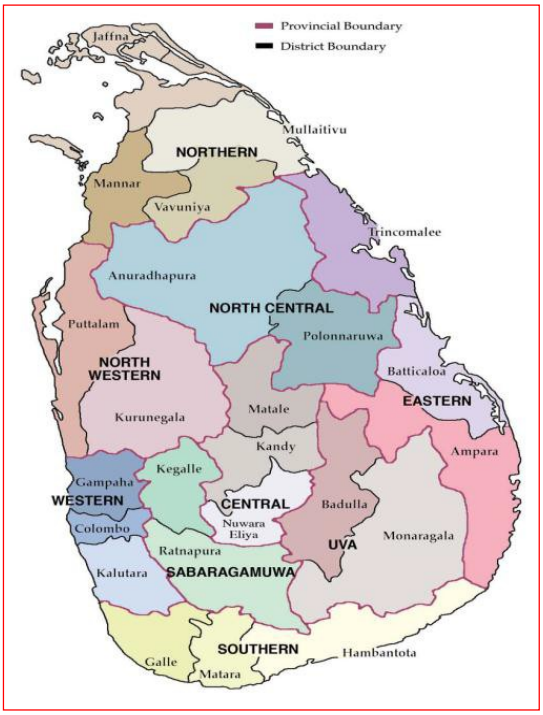
Geographical boundary of the proposed PoA is the national boundaries of Sri Lanka. All SSC-CPAs will be implemented within the Sri Lanka.



[Figure A.2 Geographical Boundary of the PoA]

A.3. Technologies/measures

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A typical CPA will have the following features;

Technology	Small-scale Hydropower technology to generation(Run-of-river)
Generation Capacity	Total installed capacity will be up to 15MW
Applicability	Greenfield project only
Usage of the produced electricity	All the electricity generation from the CPA will be supplied 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 fore-bay is used to take water from the stream to the power house. 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.

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.

A requirement of transferring technologies/measures and know-how to the host Party is not applicable under this PoA.

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

A.4. Coordinating/managing entity

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CME of the PoA as the entity which communicates with the CDM Executive Board:
Sri Lanka Climate~~arbon~~ Fund (Private) Limited., Sri Lanka

A.5. Parties and project participants

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

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Sri Lanka (Host party)	• Public entity : Sri Lanka ~~Carbon~~Climate Fund (Private) Limited (CME) (*Private-Public partnership company) • Private entity : Koho Trading & Consultancy (Private) Limited (Project participant)	No
Republic of Korea	• Public entity : Korea Environment Corporation (Project participant)	No

A.6. Public funding of PoA

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All CPAs under the PoA shall not be involved on sources of public funding from Parties included in Annex I to the United National Framework Convention on Climate Change (UNFCCC). If any, the CPA shall provide an affirmation obtained from the Parties included in Annex I that such funding does not result in a division of official development assistance, and is separate from and not counted towards the financial obligations of those Parties.

SECTION B. Management system

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The operational management system of this PoA will be documented and the PoA will be implemented as per the Document of the Operational and Management System for Programme of Small Scale Hydropower CDM in Sri Lanka (hereinafter 'Operational Management System'). This document has a purpose for CME to develop various procedures in order to operate this PoA in stable condition and involves a range of operational activities in order to implement and manage the CPA by CME.

In accordance with the Standard 'CDM-EB93-A07-STAN, CDM project standard for programmes of activities (Version 02.0 (EB 101, Annex 3)[5]', the CME will establish 'operational and management system' for the implementation of the PoA, including the following;

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

Since the 'operational and management system' is subject to continuous improvement for better management control based on the changes/requirements incurred from time to time during the operation of the PoA or on requests from the CPA Implementers or on findings during the validation and verification processes, its content and structure can be differed over the time. Nevertheless, any changes that a DOE might observe at the time of inclusion of CPAs after validation of the PoA will documented through the procedure for continuous improvement.

Roles and responsibilities of personnel involved

Entity	Department/ Personnel	Role and Responsibility
CME (SLCF)	Administration	- to receive 'Letter of Intent' for CPA inclusion & assess the eligibility criteria - to make contract with CPA Implementers - to issue, allocate, trade of CERs - to communicate with CDM EB, DOE and DNA - to manage and storage of data & records safely - to improve the document of operational & management system continuously
	Technical & Operation	- to review information & data for inclusion of CPA - to confirm installed capacity, technology, equipment and location of the CPAs - to establish monitoring plan & monitoring system - to provide training session on the monitoring requirement for the CPA Implementers - to prepare CPA-DD, Monitoring Report

[5] https://cdm.unfccc.int/filestorage/e/x/t/extfile-20181221092036155-Reg_stan03v02.pdf/Reg_stan03v02.pdf?t=NEN8cG42anc5fDCvSE4w75dta1ykTdzf6Mps

CPA Implementer	Administration	- to submit information & data for eligibility criteria check for CPA inclusion - to make contract with CME for CPA inclusion - to conduct local stakeholders' consultation meeting and to satisfy comments raised from the meeting before commencement of construction - to conduct Environmental Impact Analysis according to the National Environmental Act of Sri Lanka (IEER/EIA) - to supply information & data to prepare CPA-DD and Monitoring Report
	Technical & Operation	- to design, construct, operate, maintain and manage the plant and monitoring equipment - to collect and report monitoring data
● KECO and KoHo supports SLCF(CME) and CPA Implementers for CDM related activities		

All personnel who are involved in the process of inclusion of CPAs are to be maintained their competencies through regular training and education.

SLCF as CME shall provide regular training and education for the personnel of the CME and of CPA Implementers with assistances from KECO/KOHO.

The CPA Implementers shall train its employees to be technically adequate and confident on job performance of installation, maintenance, and management of power plant by providing regular training with assistances from the CME.

Records of arrangements for training and capacity development for personnel;

Training program for 'training and capacity development for personnel' will established by the CME for CPA Implementers.

The training program refers to activities and programs carried out by the CME or outside institute with goal of maintaining and improving the job performance, qualifications and skills of the CPA personnel. CPA Implementers are responsible to maintain competencies and job performance of its personnel.

The training will be conducted on regular basis with updated information. Training contents to improve competencies and capacity development are as follows;

Training Contents
- EB Guidelines and Methodology (AMS-I.D) - CDM Procedures - Monitoring parameter - Monitoring method and frequency - Calibration - Recording, Reporting of monitoring data - Data collection, management, storage

A procedure for technical review of inclusion of CPAs;

As the first step of inclusion of CPAs, the potential CPA Implementers shall submit to CME the 'Letter of Intent' for CPA Inclusion together with supporting information and documentary evidences, such as installed capacity, technical specification, SPPA and environment approval of the proposed CPA.

Technical team of the CME shall review the documentary information submitted by the potential CPA Implementer on desk and then visit the site to verify the actual with the information submitted before confirmation of inclusion into the PoA on following criteria;

Items		Description	Check
1	Technology/ Methodology	- Run-of river hydropower generation technology - Grid connectivity - A new power plant (Greenfield project) - If reservoir, the power density of the power plant is greater than 4W/m^2	Yes/No
2	Installed Capacity	- Capacity not exceeds 15MW	Yes/No

A procedure to avoid double counting:

The CME performs double counting check for every proposed CPA prior to confirmation of CPA Inclusion by checking the proposed CPA with the list of project activities that are under CDM pipeline of validation or registered at the UNFCCC.

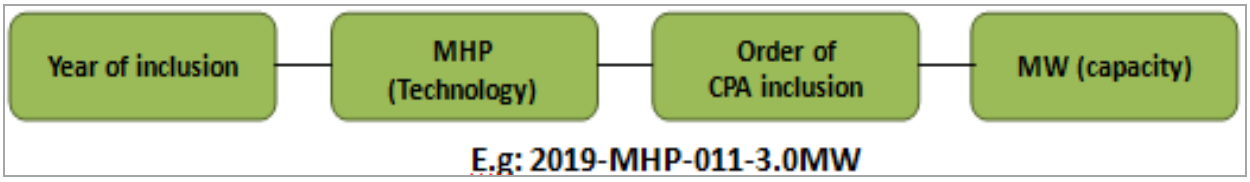
The CME makes aware CPA Implementers the double counting principle.

The CPA Implementer submit a written confirmation that the proposed CPA is not registered or in CDM pipeline going through the process of validation as a CDM project activity or included as a CPA in another registered CDM PoA or under any greenhouse gases reduction voluntary scheme.

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

In order to unambiguously identify each CPA in this PoA, CME will assign an ID number to each CPA for the identification and control of CPAs in the PoA at the time of the CME-CPA agreement.

This ID numbering system will be maintained in MS excel database.



[Figure B.1 : I.D. format of CPA]

The CME shall record the information of CPA;

- Name, address of the CPA Implementer
- Capacity of the CPA
- Geographical coordinates (GPS information) of the CPA
- Technical specification of the CPA
- Check if the equipment in the CPA was transferred from or to another project activity

The CME shall develop and maintain an electronic database contains essential data and information about each CPA, including;

1. Technical Document
   - Project Design Document (PoA-DD and CPA-DDs)
   - Validation Report of the PoA and the CPAs
   - Government approvals
   - 'Operational & Management System' document
   - Monitoring Reports
   - Eligibility Criteria Check data

2. Standard Document/Information
   - CDM-PoA-DD
   - CDM-CPA-DD
   - AMS-I.D., Grid connected renewable electricity generation
   - Methodological Tools
   - Guidelines and Standards

3. General document
   General documents shall be classified into
   1) Internal documents such as minutes, notes of CPA Implementers, and
   2) The CME and External documents such as the official notes from government offices and 3rd parties.

Measures for continuous improvements of the PoA management system:

The CME updates/improves the 'operational and management system' continuously for better management control based on changes/requirements incurred from time to time during the operation of the PoA, or on requests from the CPA Implementers or findings during the validation and verification processes.

The improvement of the management system may include addition or restructuring of functions/posts for which approval by the Board is not required as long as the CME is able to demonstrate to the DOE that the deliverables of the management system specified in the registered PoA-DD are fully met.

Any other relevant elements.

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

The CME shall enter into a contractual agreement with the CPA Implementers prior to inclusion of the CPAs in order to ensure that the operators of the CPAs are aware of and have agreed to its

participation into the PoA.

The contractual agreement shall include following provisions;

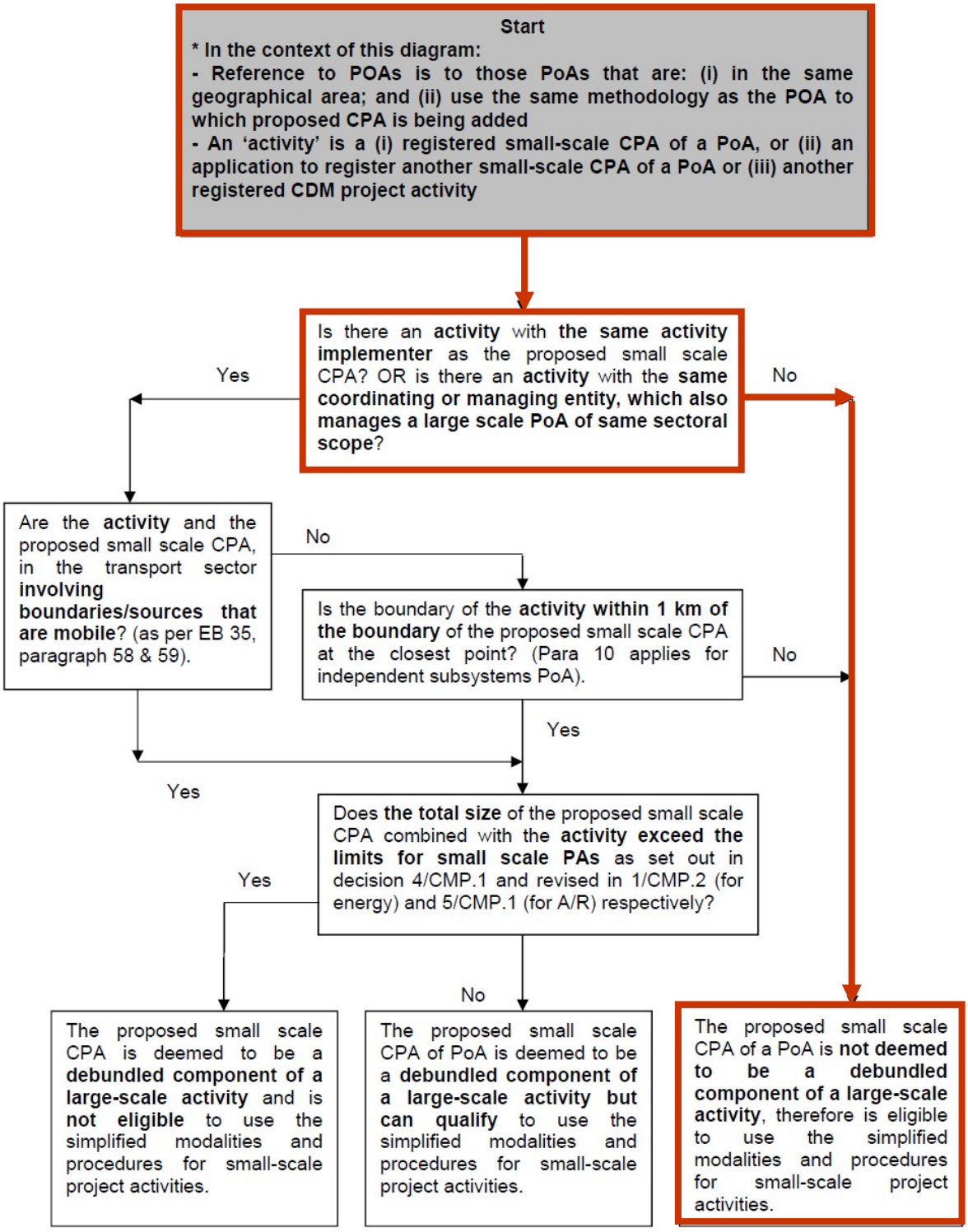
- The CPA implementer is aware that the CPA will be subscribed to the present PoA.
- The CPA implementer ensures that the proposed small-scale CPA is not deemed to be a de-bundled component of a large scale project activity.
- The CPA implementer may cede its rights to claim and own emission reductions 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

In case that CPA implementer is same with CME, the agreement is not necessary.

Procedure to check de-bundled component;

The de-bundling check will be performed based on "TOOL20 Assessment of de-bundling for small-scale project activities (Version 04.0)."

The proposed CPAs shall be checked with the list of project activities that are under validation or registered in CDM pipeline at the UNFCCC by the CME, and the CME shall make aware CPA implementers the de-bundling rules before inclusion.

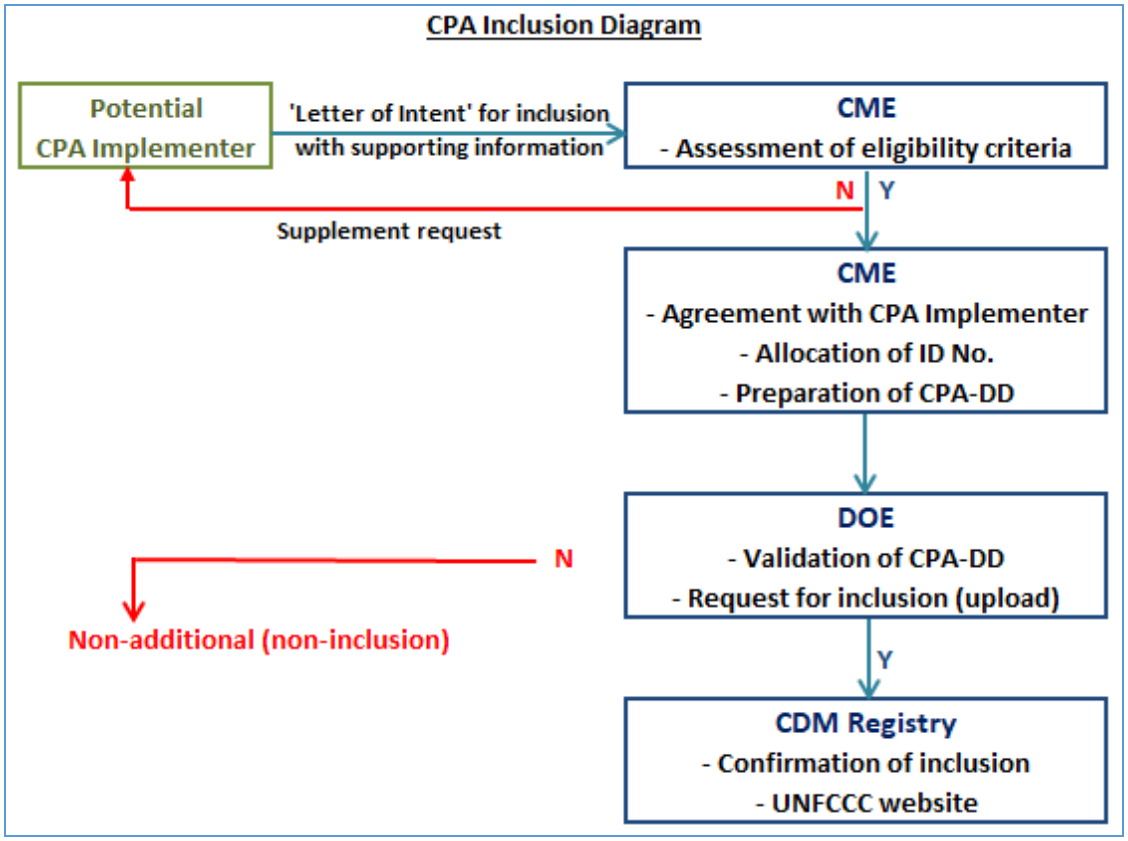


[Figure B.2: De-bundling check]

Competencies to check eligibility criteria for inclusion of CPAs by CME personnel

Administration and Technical personnel of the CME who are responsible for inclusion of CPAs will maintain their competencies to check eligibility criteria for inclusion at all time through regular and continuous training and education.

Technical officers and approver for the eligibility criteria check shall have sounding academic background with minimum 2 years professional experience in relevant field.
The training and education shall be set by the CME with assistances from KECO/KOHO.



[Figure B.3: Diagram for CPA Inclusion]

SECTION C. Demonstration of additionality of PoA

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In the absence of the PoA, none of the CPAs that will be implemented under the PoA would occur;

Most of small-scale hydropower projects in Sri Lanka are located in the remote and rural area of the country and demands extra hard work and substantial investment to develop the projects. These projects are not financially attractive to the developers unless additional income sources such as revenue from CERs are available.

None of CPAs would not and would have not been able to implement without the PoA as the small-scale hydropower projects in Sri Lanka are not viable and/or sustainable without provision for additional revenue from CERs to the projects under the PoA.

As the PoA consists of one or more small-scale projects as CPAs, the additionality is demonstrated at the CPA level using appropriate tool. Most of CPAs will demonstrate the additionality using investment analysis as per the "TOOL21 Demonstration of additionality of small-scale project activities (Version 12.0)" and "TOOL01 Tool for the demonstration and assessment of additionality (Version 07.0.0)."

In case that the CPAs are automatically additional as per the "TOOL21 Demonstration of additionality of small-scale project activities (Version 12.0)" or "TOOL19 Demonstration of additionality of microscale project activities (Version 09.0)," the CPA can use appropriate tool.
Assessment procedures of additionality of each CPA is described in Section K of this PoA-DD.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

>>
05/02/2013 (The date of publication of the PoA-DD at the stage of GSC)

D.2. Duration of PoA

>>
28 years

SECTION E. Environmental impacts

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

>>
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 environmental impacts

>>
Not applicable. The analysis of the environmental impacts is to be carried out at the CPA level.

E.3. Environmental impact assessment

>>
Not applicable. The analysis of environmental impacts, including transboundary impacts, will be conducted at CPA level.

SECTION F. Local stakeholder consultation

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

>>
There are no host Party rules on local stakeholder consultation in Sri Lanka and no local stakeholder consultation is carried out for the whole PoA.
Local stakeholder consultation is undertaken at the CPA level for adequate and area-specific consultation as the CPAs are located across the geographical national boundaries of Sri Lanka
Local stakeholder consultation is carried out mostly during the process of environmental impact assessment.

F.2. Modalities for local stakeholder consultation

>>
Not applicable. The local stakeholder consultation is to be carried out at the CPA level.

F.3. Summary of comments received

>>
Not applicable. The local stakeholder consultation is to be carried out at the CPA level.

F.4. Consideration of comments received

>>
Not applicable. The local stakeholder consultation is to be carried out at the CPA level.

SECTION G. Approval and authorization

>>
The approval certificates were provided to the DOE.

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

>>
Small-scale Hydropower Project

H.2. Reference number of generic CPA

>>
Not applicable.
Single generic CPA.

H.3. Purpose and general description of generic CPA

>>
This generic CPA is a part of "***Programme of Activities for Small Scale Hydropower CDM in Sri Lanka***"
(hereafter 'PoA').
This generic CPA aims to mitigate GHG emissions through renewable energy project using hydropower which supplies electricity to National Grid of Sri Lanka. This generic CPA has a significant effect on reducing GHG emissions from electricity generation using fossil fuel. The CPAs consist of a hydropower plant with the capacity of below or equal to 15MW.

H.4. Technologies/measures

>>
The project activity of this generic CPA is to construct and operate a new small-scale hydro power plant using hydropower electricity generation technology that supplies electricity to national grid owned by Ceylon Electricity Board (CEB).

The CPAs will introduce run-of-river hydropower generation technology contributing to the improvement of environment by reducing emissions such as SOx and NOx from thermal power plants in addition to the reduction of CO_2 emission.

Technology	Run-of-river hydropower generation technology
Generation Capacity	Total installed capacity not exceeds 15MW
Applicability	Greenfield project only
Disposal of the generated electricity	Supplies to the national grid

The CPAs use potential hydro energy available in the stream to drive turbines and discharges the water back to the stream at lower than water intake point. The facility consists intake structure comprising of weir/intake, headrace channel, de-silting tank/fore bay, penstock line, and powerhouse with turbines, generators, transformers and switchyard with electricity meter and transmission line up to the nearest sub-station and access road.

The CPAs installs new equipment with an average lifetime of 20 years based on the manufacturer's specification and industry standards. The total installed capacity will be less than or equal to 15 MW. The plant load factor will vary between 25% and 50% based on the availability of water. The overall efficiency of equipment will be more than 70%.

CEB owned bi-directional electricity meter will be installed on the site in a sealed meter-room and reading of the meter by CEB personnel for the electricity supplied by the CPA to the grid and electricity delivered to the CPA from the grid will be done on monthly basis as per the Standardized Power Purchase Agreement (SPPA).

The CPAs install new small-scale hydropower plant at a site where there was no renewable energy power plant operating prior to the implementation of the CPA (Greenfield plant).

As per the Methodology AMS-I.D. (Version 18.0), the baseline scenario of this generic CPA is the electricity delivered to the grid by the CPAs would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

>>

The following methodology and tools will be used in this generic CPA. No standardized baselines are applied by the PoA.

Methodology

- AMS-I.D. Grid connected renewable electricity generation (Version 18.0)[6]

Tool

- TOOL01 Tool for the demonstration and assessment of additionality (Version 07.0.0)
- TOOL03 Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (Version 03.0)
- TOOL07 Tool to calculate the emission factor for an electrical system (Version 07.0)
- TOOL10 Tool to determine the remaining lifetime of equipment (Version 1)
- TOOL11 Tool for Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 3.0.1)
- TOOL19 Demonstration of additionality of microscale project activities (Version 09.0)

[6] https://cdm.unfccc.int/filestorage/2/P/7/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC/EB81_repan24_AMS-I.D_ver18.pdf?t=VHZ8cHV2Znc5fDDFjQ-XdyGs7O3_P7fyd0nX

- TOOL20 Assessment of de-bundling for small-scale project activities (Version 04.0)
- TOOL21 Demonstration of additionality of small-scale project activities (Version 12.0)
- TOOL27 Investment analysis (Version 09.0)

Sectoral Scope: 1 "Energy industries (renewable - / non-renewable sources)"

I.2. Applicability of methodologies and standardized baselines

>>

Methodology AMS-I.D Ver.18 is selected and demonstrates justifications as below:

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

<table>
<tr><th></th><th>Applicability Check of AMS ID Ver.18</th><th>CPA justification</th></tr>
<tr><td>1</td><td>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</td><td>Yes
This generic CPA is renewable energy generation units using run-of-river hydro energy generation technology and supplies electricity to the National grid (CEB).</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) applies is included as below:
<table>
<tr><th>Project</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
This generic CPA supplies electricity to the National grid (CEB). Therefore AMS-I.D is applicable.</td></tr>
<tr><td>3</td><td>This methodology is applicable to project activities that:
(a) Install a Greenfield plant;
(b) Involve a capacity addition in (an) existing plant(s);
(c) Involve a retrofit of (an) existing plant(s);
(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or
(e) Involve a replacement of (an) existing plant(s).</td><td>Yes
This generic CPA installs a new small-scale hydropower plant at a site where there was no renewable energy power plant operating prior to the implementation of the CPA (Greenfield plant)</td></tr>
</table>

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.	**Yes** Most of the CPAs in the PoA do not involve the reservoirs. However, 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	**Yes** This generic CPA installs renewable component with maximum installed capacity of 15 MW.
6	Combined heat and power (co-generation) systems are not eligible under this category.	**Not applicable** This generic CPA is renewable power (small-scale hydropower) generation system.
7	In the case of project activities that involve the capacity 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.	**Not applicable** This generic CPA installs new renewable power generation facility (hydropower) with maximum installed capacity of 15 MW. However, any CPAs involve the capacity addition of renewable energy generation units, the units added shall be lower than 15MW and physically distinct from the existing
8	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	**Not applicable** This generic CPA installs a new plant, and do not seek retrofit, rehabilitation or replacement to qualify as a small-scale project.
9	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	**Not applicable** This generic CPA is renewable power (small-scale hydropower) generation system.
10	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	**Not applicable** This generic CPA is renewable power (small-scale hydropower) generation system.

I.3. Application of multiple methodologies

>>

Not applicable. The generic CPA does not apply a combination of multiple methodologies.

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

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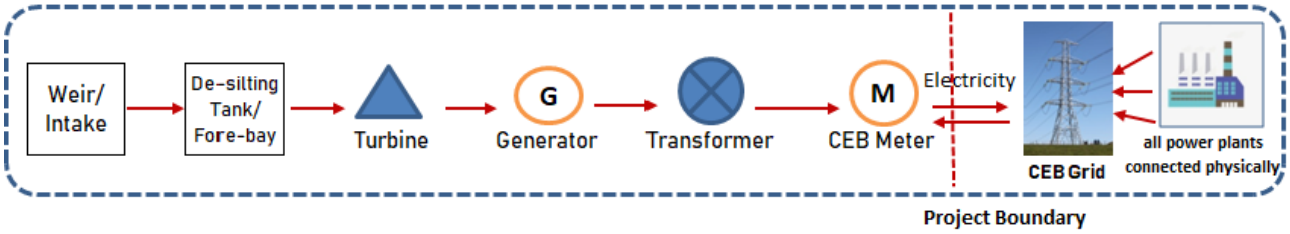
Project boundary

According to the methodology AMS-I.D. (Version 18.0), project boundary defines as '***The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.'***

The project boundary of the CPAs includes the power plant, metering point, sub-station, CEB grid, and all power plants that connected physically to the CEB grid.



[Figure I.1 Project boundary]

Sources and greenhouse gases (GHGs)

The emission sources and GHGs included in the project boundary for baseline emissions are as below.

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

	Source	GHG	Included?	Justification/Explanation
Baseline	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 activity	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

I.5. Establishment and description of baseline scenario

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This generic CPA included in the PoA involves the generation of electricity from renewable energy and exporting the same to the national grid. As per methodology AMS-I.D (Ver.18), the baseline

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

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

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The emission reductions calculation for the CPAs of this generic CPA are in accordance with the approved methodology AMS- I.D. (Ver.18).

The CPAs 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.

The applied methodology, project type and the Sectoral Scope are given below.

- Sectoral Scope : 1 – Energy industries (renewable / non-renewable sources)
- Methodology : AMS-I.D - Grid connected renewable electricity generation (Ver. 18)
- Project Type : I – Renewable Energy Project (Small Scale)

Tools referred to above methodology are:

[Table I.3 Referred tools for ER calculation]

No.	Name	Calculated parameter	Purpose of reference
1	Tool to calculate the emission factor for an electrical system (version 07.0)	$EF_{grid,y}$	Calculation of Baseline emissions
2	Tool to calculate project and leakage CO_2 emission from fossil fuel combustion (version 03.0)	$PE_{FC,i,j,y}$	Calculation of Project emissions

There may be revisions of the tools above at the time of CPAs inclusion after the PoA registration and should 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 operates small scale, run-of-river hydropower plant, with maximum installed capacity of 15MW that displaces fossil fuel fired electricity generation from thermal power plant to the National Grid of Sri Lanka. This fulfill the requirement for applying methodology AMS-I.D (Ver.18) for CDM small-scale projects. This section explains the procedure be 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.18), baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,y}$$

Where;

BE_y Baseline Emission in year y (tCO_2)

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

$EF_{grid,y}$ Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

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

In accordance with the AMS-I.D (Ver.18), the emission factor shall 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_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Of these two options, ***option A*** will be used. The baseline emission factor is calculated using following steps in the "Tool to calculate the emission factor for an electricity system (Version 07.0)".

STEP 1. Identify the relevant electricity systems

For determining the electricity emission factors, the project participants shall identify the relevant **project electricity system**.

Similarly, the project participants shall identify any **connected electricity systems**. If a connected electricity system is located partially or totally in Annex I countries, then the emission factor of that connected electricity system should be considered zero.

Project participants may delineate the project electricity system using any of the following options:

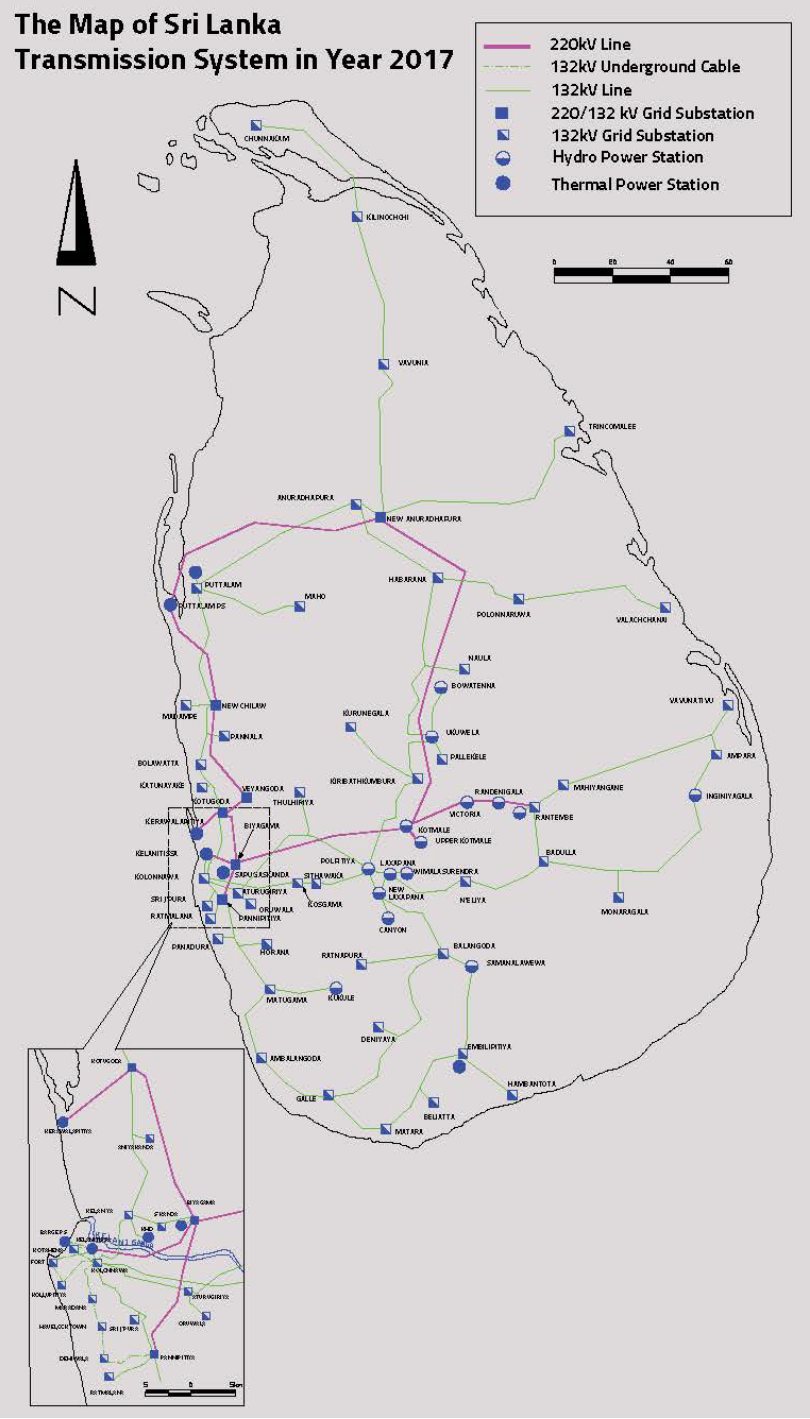
Option 1: A delineation of the project electricity system and connected electricity systems published by the DNA or the group of the DNAs of the host country(ies), In case a delineation is provided by a group of DNAs, the same delineation should be used by all the project participants applying the tool in these countries;

Option 2: A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity. Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher level area shall be used as a delineation

of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);

Option 3: A delineation of the project electricity system defined by more than one independent dispatch areas, e.g. multi-national power pools.

In Sri Lanka, there is only one electricity transmission system which is owned and operated by the national utility known as Ceylon Electricity Board (CEB). It is also demonstrated by the Map of Sri Lanka Transmission System in Year 2017 in the 'Statistical Digest 2017(CEB)'. Therefore ***Option 1*** is used and each CPA under the PoA will be connected to this network.



[Figure I.2 The Map of Sri Lanka Transmission System]

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

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

The Simple OM method can only be used if any one of the following requirements is satisfied:

(a) Low-cost/must-run resources constitute less than 50 per cent of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, and the average of the five most recent years shall be determined by using one of the approaches described below; or 2)cc based on long-term averages for hydroelectricity production (minimum time frame of 15 years):

(b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three year (i.e. average of EG_{LCMRy}/8760, $EG_{LCMRy-1}$/8760, $EG_{LCMRy-2}$/8760) is less than the average of the lowest annual system loads (LASL) in the grid of the same three years (i.e. average of $LASL_y$, $LASL_{y-1}$, $LASL_{y-2}$).

As shown in the below table, the low-cost/must run power plant in Sri Lanka constitutes [insert value]% 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, ***(a) Simple OM method*** is used for the calculation of Operating Margin emission factor as demonstrated by following equation of ***Approach 1 in the option (a).***

Share $_{LCMR}$ = average [($EG_{LCMRy-4}$ / $total_{y-4}$), … , (EG_{LCMRy} / $total_y$)]

Where;

$Share_{LCMR}$ = Share of the low cost/must run resources (per cent)

EG_{LCMRy} = Electricity generation supplied to the project electricity system by the low cost/must run resources in year *y* (GWh)

$total_y$ = Total electricity generation supplied to the project electricity system in year *y* (GWh)

y = The most recent year for which data is available

[Table I.4: Electricity Generation over the five most recent years at the time of submissions of the renewal PoA-DD]

Parameter	Year				
	2013	**2014**	**2015**	**2016**	**2017**
EG_{LCMRy}(GWh)	7,169	4,849	6,372	4,640	4,523
Thermal electricity generation(GWh)	4,729	7,508	6,718	9,508	10,148
$total_y$(GWh)	11,898	12,357	13,090	14,148	14,671
Annual $Share_{LCMR}$(%)	60.25	39.24	48.68	32.80	30.83
$Share_{LCMR}$(%)	***42.36***				

** Source : Statistical Digest 2013-2017 (CEB, https://www.ceb.lk/publication-media/annual-reports/en)*

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

(a) Ex ante option: if the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation;

(b) Ex post option: if the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate 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. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year proceeding the previous year *y-2* may be used. The same data vintage (*y, y-1* or *y-2*) should be used throughout all crediting periods.

In this generic CPA, the Simple OM has been calculated ***EX ANTE*** option, 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. The data vintage and calculated OM will not be changed during the crediting period.

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. The simple OM may be calculated by one of the following two options:

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.

Option B can only be used if: (i) The necessary data for Option A is not available; and (ii) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and (iii) Off-grid power plants are not included in the calculation.

In this generic CPA, ***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:

$$EF_{\text{grid,OMsimple,y}} = \frac{\sum_m EG_{m,y} * EF_{\text{EL,m,y}}}{\sum_m EG_{m,y}}$$

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. If for a 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;

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

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 will be made for year y-2, y-1, y 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).

$$EF_{grid,simple,om} = \frac{(\sum EG_{j,y-2} * EF_{grid,sim,om,y-2} + \sum EG_{j,y-1} * EF_{grid,sim,om,y-1} + \sum EG_{j,y} * EF_{grid,sim,om,y})}{(\sum EG_{j,y-2} + \sum EG_{j,y-1} + \sum EG_{j,y})}$$

Where,

$EF_{grid,simple,om}$	Operating Margin
$EF_{grid,sim,om,y-2}$	Operating Margin emission factor for y-2
$EF_{grid,sim,om,y-1}$	Operating Margin emission factor for y-1
$EF_{grid,sim,om,y}$	Operating Margin emission factor for y
$\sum Gen_{j,y-2}$	Total generation of the plant j in y-2
$\sum Gen_{j,y-1}$	Total generation of the plant j in y-1
$\sum Gen_{j,y}$	Total generation of the plant j in y

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

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

***Option 1*:** For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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

Option 1 has been chosen for the calculation of Build Margin (BM) in this generic CPA.

According to "Tool to calculate the emission factor for an electricity system" (Version 04.0), the sample group of power unit *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

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

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

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

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

In this generic CPA, SET_{sample} exceeds 20% of the annual electricity generation and none of the power units in SET_{sample} started to supplies electricity to the grid more than 10 years ago. Thus, is SET_{sample} is used to calculate the build margin as per Step (a) ~ (c) above and Step (d), (e) and (f) in the Tool is not required.

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

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

Where;

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

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

(d) Weighted average CM; or

(e) Simplified CM

In this generic CPA, Sri Lanka is not a LDC/SIDs/URC and the grid is not isolated system. Therefore ***(a) Weighted average CM*** method is used.

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}:

(a) 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.

(b) 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.

Option (b) is used in order to calculate the emission factor of hydropower project. Sources of data used to determine the emission factors are as follows:

- Tool to calculate the emission factor for an electricity system (Version 07.0)
- Statistical Digest [y-4 ~ y] (issued by CEB)
- Sri Lanka Energy Balance [y] (issued by Sri Lanka Sustainable Energy Authority)

The $EF_{grid,y}$ calculated at time of submission of PoA-DD to the DOE for validation of renewal of PoA period (1st renewal) is as below:

- $EF_{grid,y}$ for the 1st crediting period : **0.8108** tCO_2/MWh.
- $EF_{grid,y}$ for the 2nd and 3rd crediting period : **0.8666** tCO_2/MWh.

(2) Project Emission (PE_y):

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

This generic CPA involves small-scale hydropower generation project activity, and does not involves reservoirs, and does not consumes the fossil fuels due to the project activity, and will not have backup generator driven by fossil fuels. Therefore, the Project Emissions are zero.

However, for CPAs that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, the CPA implementer 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

(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).

- 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:

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

Where,

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion in process j during the year y (t CO_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 (t CO_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:

$$\mathbf{COEF}_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

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 CO_2 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 Emission (LE_y):

As per category AMS-I.D (Ver.18), leakage is to be considered only for biomass project activities. Since this generic CPA is not biomass projects, Leakage Emissions are 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)

I.6.2. Data and parameters fixed ex ante

Data / Parameter	EF_{grid}
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor of the grid electricity
Source of data	Official statistics
Value(s) applied	- [value will be determined in specific CPA-DD]
Choice of data or Measurement methods and procedures	The data shall be the official statistics from Energy Balance issued by Sri Lanka Sustainable Energy Authority. (http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)
Purpose of data	Calculation of baseline emissions
Additional comment	- The value applied is ex-ante and will be valid for the crediting period without updates

Data / Parameter	$EF_{grid,OM}$
Unit	tCO_2/MWh
Description	Operating Margin emission factor
Source of data	Official statistics
Value(s) applied	[value will be determined in specific CPA-DD]
Choice of data or Measurement methods and procedures	The data shall be the official statistics from Energy Balance issued by Sri Lanka Sustainable Energy Authority. (http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)
Purpose of data	Calculation of baseline emissions
Additional comment	- The value applied is ex-ante and will be valid for the crediting period without updates

Data / Parameter	$EF_{grid,BM}$
Unit	tCO_2/MWh
Description	Build Margin emission factor
Source of data	Official statistics
Value(s) applied	[value will be determined in specific CPA-DD]
Choice of data or Measurement methods and procedures	The data shall be the official statistics from Energy Balance issued by Sri Lanka Sustainable Energy Authority. (http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)
Purpose of data	Calculation of baseline emissions
Additional comment	- The value applied is ex-ante and will be valid for the crediting period without updates

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. For new hydro power plants, this value is zero
Source of data	Project site
Value(s) applied	To be filled by CPA (Applied value depends on each CPA.)
Choice of data or Measurement methods and	Determine the installed capacity based on manufacturer's specifications or recognized standards
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. For new reservoirs, this value is zero.
Source of data	Project site
Value(s) applied	To be filled by CPA (Applied value depends on each CPA.)
Choice of data or Measurement methods and	Measured from topographical surveys, maps, satellite pictures, etc.
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

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

>>

(1) Baseline Emission (BE_y)

As per the guidance provided in AMS-I.D (Ver.18), baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,,y} * EF_{grid,y}$$

Where;

BE_y Baseline Emission in year y (tCO_2)

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

$EF_{grid,y}$ Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

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

* $EG_{PJ,y}$ = *Plant capacity(MW) x [Plant Load Factor] x 24 hrs/day x 365 days/yr*
* $EF_{grid,y}$ = $EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$

Thus, BE_y = Net generation (MWh/y) x Emission factor (tCO_2/MWh)

(2) Project Emission (PE_y)

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

This generic CPA involves small-scale hydropower generation project activity, and does not involves reservoirs, and does not consumes the fossil fuels due to the project activity, and will not have backup generator driven by fossil fuels. Therefore, the Project Emissions are zero.

However, for CPAs that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, the CPA implementer 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

(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).

- 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:

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

Where,

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion in process j during the year y (t CO_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 (t CO_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 Emission (LE_y)

As per category AMS-I.D (Ver.18), leakage is to be considered only for biomass project activities. Since this generic CPA is not biomass projects, Leakage Emissions are 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)

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJ, y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meter(s)
Value(s) applied	Each CPA will obtain this value in accordance with project parameter.
Measurement methods and procedures	This parameter can be either monitored using bi-directional electricity meter of calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid
Monitoring frequency	Recorded Monthly
QA/QC procedures	- Calibration frequency: According to manufacturer specifications or national standards. - Calibration shall be carried out by an accredited person or institution.
Purpose of data	Calculation of baseline emissions
Additional comment	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_{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Value(s) applied	To be filled by CPA (Applied value depends on each CPA.)
Measurement methods and procedures	Determine the installed capacity based on manufacturer's specifications or commissioning data or recognized standards
Monitoring frequency	Once at the beginning of each crediting period
QA/QC procedures	-
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_{PJ}
Data unit	m^2
Description	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
Source of data	Project site
Value(s) applied	To be filled by CPA (Applied value depends on each CPA.)
Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	Once at the beginning of each crediting period
QA/QC procedures	-
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	TEG_y
Data unit	MWh/year
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 depends on each CPA.)
Measurement methods and procedures	Electricity meters
Monitoring frequency	Monthly
QA/QC procedures	-
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	$FC_{i,j,y}$
Data unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fuel type i combusted in process j during the year y
Source of data	CPA On-site measurements
Value(s) applied	To be filled by CPA (Applied value depends 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 comment	In case that CPA consume fossil fuels due to the project activity

Data/Parameter	$NCV_{i,y}$
Data unit	GJ per mass or volume unit (e.g. GJ/m³, GJ/ton)
Description	Weighted average net calorific value of fuel type i in year y
Source of data	Sri Lanka Energy Balance 2017
Value(s) applied	To be filled by CPA (applied value is depending on each CPA)
Measurement methods and procedures	-
Monitoring frequency	Publication of annual energy balance in Sri Lanka
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	In case that CPA consume fossil fuels due to the project activity. NCV data is collected from several institutions including petroleum corporations, and it is aggregated at the national level and externally published.

Data/Parameter	$EF_{CO2,i,y}$
Data unit	tCO_2/GJ
Description	Weighted average CO2 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 1.4 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 depending 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 comment	In case that CPA consume fossil fuels due to the project activity

I.7.2. Sampling plan

>>
Not applicable.
No sampling approach is applied.

I.7.3. Other elements of monitoring plan

>>
SLCF as the coordinating/ managing entity will set up the procedures for verifying and issuance of the CERs generated by the CPAs. The authority and responsibility of project management, monitoring data are remains with the CPA. The CPAs provides the monitoring data to the CME.

Data Collection and Storage
The monitoring and recording activities as per CDM requirement shall be implemented by the CPA Implementers. All the data collected by the CPA will manually documented and electronically saved. The collected data shall be saved as computer file at least once a month. All the data collected will be stored for two years after the end of the crediting period of the CPAs. The monitoring procedure for each parameter is set out in the Operational and Management System.

Training
The CPA Implementers are required to organize training for its staffs responsible for operation and maintenance of the power plant facility. The training includes maintenance, repair, overhaul as per manufacturer's specification. The person in charge of CDM monitoring will be trained in accordance with the updates of CDM requirement.

Operational and Monitoring Obligations
The procedures for monitoring activities by the CPAs are specified in the Operational and Management System. The system will define the procedures for monitoring and recording of data, and training of operation personnel in order to maintain accuracy and viability of data for the CDM requirement.

Quality Assurance and Quality Control
The quality assurance and quality control system for recording, managing and archiving of data shall be carried out by the CPAs. The training of the CPA personnel for their capability and competency shall be provided on regular basis with assistance from the CME. The monitoring equipment shall be calibrated (tested) in accordance with Sri Lanka Standard or as per manufacturer's specification.

Contingency Plan
In cases of error and malfunctioning of the electricity meter, equipment or data transmission in the CPA, the person in charge of the facility shall rectify the errors immediately and restore it to the functional condition as soon as possible. The CPA shall records such incidents.

SECTION J. Crediting period type and duration

>>
Type: Renewable
Length of crediting period: 7 years and 0 month
Number of renewal of crediting periods: 2 times

SECTION K. Eligibility criteria for inclusion of CPAs

>>

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

[Table K.1: CPA eligibility criteria]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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 : Setion A.1 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	Agreement between CPA & CME and Acknowledgement by the CPA	The CPA Implementer confirms awareness of the principle/rule of the de-bundling, double counting and monitoring issues. The CPA Implementer enters into an agreement with the CME for inclusion into the PoA. (In case of the CPA implementer is same with CME, the Agreement is not required)	- Means of validation : Desk review - Evidence : CME-CPA agreement, Affirmations by the CPA Implementer
4	De-bundling check	The CPA is not a de-bundled component of a large project activity. (Is there an activity with the same CPA Implementer as the CPA? or is there an activity with the same CME which also manages a large scale PoA of same sectoral scope?)	- Means of validation : Desk review/On-site visit - Evidence : Section B of PoA-DD, Part I, Affirmation by the CPA Implementer
5	Double counting check	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 installs run-of-river hydropower generation technology. (If new reservoirs involves, the power density of the power plant is greater than 4W/m^2)	- Means of validation : Desk review/On-site visit - Evidence : manufacturer's Technical Specifications
7	Methodology Applicability (AMS-I.D Ver.18)	- The CPA (a) supplies electricity to a national/regional grid or (b) supplies electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling - The CPA installs a new power plant (Greenfield plant)	- Means of validation : Desk review/On-site visit - Evidence : SPPA, Manufacturer's Technical Specifications

8	No Public Funding from Parties in Annex I	The CPA is not involves on sources of public funding from Parties included in Annex I to the United National Framework Convention on Climate Change (UNFCCC). If any, such funding does not result in a diversion of official development assistance, and is separate from and not counted towards the financial obligations of those Parties	- Means of validation : Desk review - Evidence : Affirmation by the CPA Implementer
9	Additionality	The CPA shall follow the process in Section C of PoA-DD, Part I for 'Demonstration of additionality of PoA', and procedure in the Section K of PoA-DD, Part II for 'Eligibility criteria for inclusion of CPAs'	- Means of validation : Desk review - Evidence : CPA-DD, Investment analysis spread sheet with evidence for project IRR calculation
10	CPA start date	The CPA is not started prior to the start date of the PoA, i.e. 5 February 2013 (the date of publication of the POA-DD for GSC)	- Means of validation : Desk review - Evidence : 1st commercial contract document signed
11	Local stakeholder consultation	The CPA performs local stakeholder consultation before the inclusion in PoA and construction.	- Means of validation : Desk review - Evidence : Minutes of consultation meeting
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/EIA report & approval letter by authority, Section E of PoA-DD, Part I
13	Project type & Capacity	Type I: Renewable energy project activities with a maximum output capacity of 15MW (output = installed/rated capacity of the generator)	- Means of validation : Desk review - Evidence : Manufacturer's Technical Specifications, Feasibility Study Report
14	Target Group	The target group of each CPA will be the connected CEB grid.	- Means of validation : Desk review - Evidence : Section A of PoA-DD, Part 1, Manufacturer's Technical Specifications, Feasibility Study Report

Assessment and demonstration of additionality for this generic CPA

This generic CPA is not automatically additional as the CPAs involve small-scale hydropower generation technology that is not on the positive list of renewable electricity generation technologies in accordance with the 'TOOL21 : Demonstration of addtionality of small-scale project activities (Ver.12)'.

If the CPA employs renewable energy technology up to 5MW installed capacity and satisfies following conditions in the 'TOOL19 : Demonstration of additionality of microscale project activities (Ver. 09.0)', it can use the tool to demonstrate the microscale additionality and demonstrate the additionality automatically.

(a) The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a SUZ of the host country;

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

(i) "Specific renewable energy technologies/measures" refers to grid connected renewable energy technologies of installed capacity equal to or smaller than 5 MW;

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

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

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

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

If the CPA does not meet one of the conditions defined under the TOOL19 (Ver. 09.0), the CPAs should use the 'TOOL21 Demonstration of additionality of small-scale project activities (Ver.12)', 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:

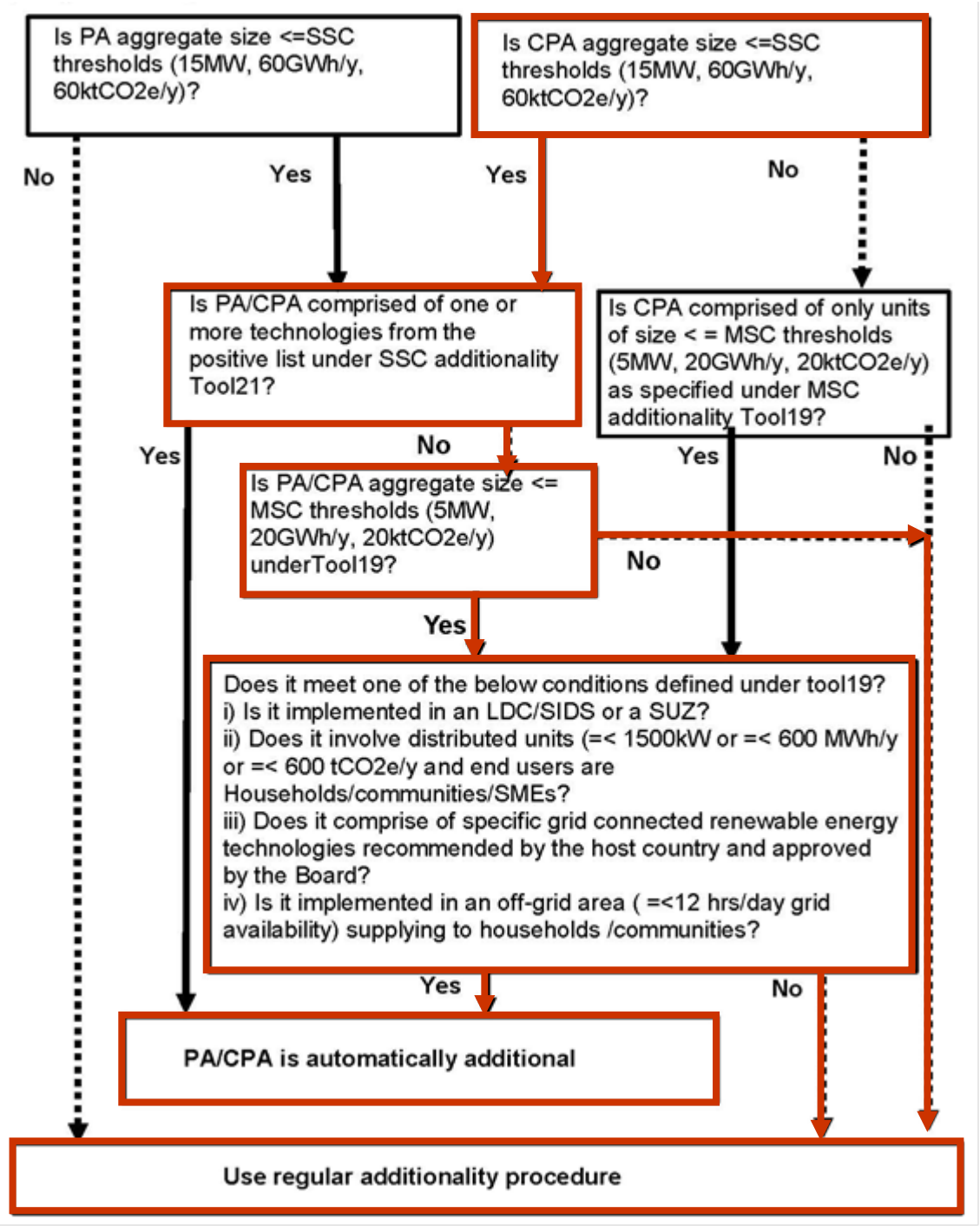
(a) Investment barrier

(b) Technological barrier

(c) Barrier due to prevailing practice

(d) Other barriers

In this generic CPA, ***(a) Investment barrier analysis*** shall be used to demonstrate the additionality. For the investment barrier analysis, 'Step 2: Investment analysis' in the "TOOL01 Tool for the demonstration and assessment of additionality (Version 07.0.0)" is used by each CPA.



[Figure K.1 Criteria for automatic additionality using SSC/MSC additionality tools]

Under Step 2: Investment analysis as per the TOOL01 (Ver. 07.0.0), three analysis methods are available.

1) Simple cost analysis (Option I);
2) Investment comparison analysis (Option II);
3) Benchmark analysis (Option III).

As the CPAs generate financial benefits other than CDM-related income, ***the benchmark analysis (Option III)*** will be used for demonstration of the additionality.

This generic CPA identifies the ***Internal Rate of Return (IRR)*** as the most suitable financial/economic indicator for the CPA as it is a standard in the market.

The ***discount rates and benchmarks*** shall be derived from;

(a) The discount rates and benchmarks shall be derived from; Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;
(b) A company internal benchmark (weighted average capital cost of the company), only in the particular case referred to above in paragraph 5. The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark;
(c) Government/official approved benchmark where such benchmarks are used for investment decisions;
(d) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified.

- ***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 K.3: Parameters for IRR calculation]**

Parameter	Unit	Value	Source
Total Project Cost	LKR Mn		Feasibility Study Report
O&M Costs	LKR Mn/year		Feasibility Study Report
Annual Estimated Electricity Generation	MWh/year		Feasibility Study Report, Technical Specification
Electricity Tariff	LKR/kWh		SPPA
Technical lifetime	years		Feasibility Study Report, Technical Specification
Benchmark	%		Local commercial lending rate

Above parameters are fixed for all CPAs and the investment analysis for project IRR calculation is demonstrated in the associated spreadsheets in Excel database.

- ***Determination of Input values***

The input values used in all investment analysis shall be valid and applicable at the time of investment decision by the CPA Implementer. As for the time of investment decision;

The date is the preparation date of feasibility study report by the CPA Implementer after securing of source of funding and project approvals for project implementation. Therefore, the date of the investment decision may vary from one CPA to another.

The project costs includes preliminary costs such as obtaining of approvals, land & access road works, utility installation (electricity & water), sub and super structure civil works, electro-mechanical equipment, transformer, electricity meter, transmission line works, interest during construction, and contingency.

O&M cost includes the remuneration of personnel, maintenance & spare costs, general administration & operational costs.

Revenue is income from electricity sales result from power generation during the project period.

- ***Selection of Benchmark***

In conformity with the Clause 15 of the "TOOL27 Investment analysis (Version 09.0)", 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

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

[**Table K.4: 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.

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

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☐ Project participant
Organization name	Sri Lanka ~~Carbon~~Climate ~~-~~Fund (Private) Limited
Country	Sri Lanka
Address	No.82, "Sampathpaya" Rajawalwaththa Road, Battaramulla~~No. 980/4A, Wickramasinghe Place, Ethul Kotte~~
Telephone	+94 114 231 874~~+94 11 2053065~~
Fax	+94 112 867 424~~+94 11 2053065~~
E-mail	chamara.cpe@gmail.com~~info@carbonfund.lk~~
Website	http://www.climatefund.lk/slcf_index
Contact person	Mr. Mahesh Chamara Ariyathilaka (Chief Executive Officer)

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	Korea Environment Corporation
Country	Republic of Korea
Address	Environmental Research Complex, 42, HwanGyeong-Ro, Seo-gu, Incheon
Telephone	+82 32 590 5622~~+82-32-590-3429~~
Fax	+82 32 590 5659~~+82-32-590-3429~~
E-mail	kets@keco.or.kr~~doolloob@keco.or.kr~~
Website	http://www.keco.or.kr/kr/main/index.do
Contact person	Mr. Beom-woong Park (Project Manager)~~Mr. Won tae~~

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	Koho Trading & Consultancy (Private) Limited
Country	Sri Lanka
Address	416/2-1, Thimbirigasyaya Road, Colombo 5~~25 Skelton Road, Colombo 5~~
Telephone	+94 773 288 236~~+94 11 2559589~~
Fax	
E-mail	janehong25@gmail.com
Website	
Contact person	Ms. Myungock Hong (Managing Director)

Appendix 2. Affirmation regarding public funding

Not Applicable

Appendix 3. Applicability of methodologies and standardized baselines

Not Applicable

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

Calculation of Grid Emission Factor

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

Parameter	Year				
	2013	2014	2015	2016	2017
$EG_{LCMR,y}$(GWh)	7,169	4,849	6,372	4,640	4,523
Thermal electricity generation(GWh)	4,729	7,508	6,718	9,508	10,148
$total_y$(GWh)	11,898	12,357	13,090	14,148	14,671
Annual $Share_{LCMR}$(%)	60.25	39.24	48.68	32.80	30.83
$Share_{LCMR}$(%)	***42.36***				

** Source : Statistical Digest 2013-2017 (CEB, https://www.ceb.lk/publication-media/annual-reports/en)*

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

Parameter	Year		
	2015	2016	2017
Emissions from Power Plants (tCO_2)	1,551,881.9	3,114,853.6	3,438,963.6
Net Electricity Generation (GWh)	2,276.3	4,460.6	4,854.9
Simple operating margin CO_2 emission factor (tCO_2/MWh)			
Three-year generation based weighted average	**0.6993**		

** Source : 2017 Energy Balance(SEA, http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)*

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

Parameter	Year		
	2015	2016	2017
Emission of power plants considered for the BM (tCO_2)	3,717,903.7	4,203,018.6	3,595,191.6
Generation of power plants considered for the BM (GWh)	3,693.3	4,467.1	3,897.9
Build margin emission factor	1.0067	0.9409	**0.9223**

** Source : 2017 Energy Balance(SEA, http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)*

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

Parameter	Weighting factor		Weighted Margin (tCO_2/MWh)
	W_{OM}	W_{BM}	
For solar, wind Projects	0.75	0.25	0.7550
All other Projects;			
1st crediting period	**0.5**	**0.5**	**0.8108**
2nd - 3rd crediting period	**0.25**	**0.75**	**0.8666**

** Source : 2017 Energy Balance(SEA, http://www.energy.gov.lk/images/energy-balance/energy-balance-2017.pdf)*

Appendix 5. Further background information on monitoring plan

Not Applicable

Appendix 6. Summary report of comments received from local stakeholders

Not Applicable

Appendix 7. Summary of post-registration changes

1. The name of the CME is changed from ‘Sri Lanka Carbon Fund (Pvt) Ltd’ to ‘Sri Lanka Climate Fund (Private) Limited’ in 2016,
2. Address of the CME changed in 2017,
3. Address of Project Participant, Koho Trading and Consultancy (Private) Limited is changed in 2014.

Thus, CME revised the PoA-DD with respect to name and address changes throughout the PoA-DD and re-issued the Host Country Approval from Sri Lanka DNA dated 30 April 2019.