



**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**

<b>Title of the PoA</b>	Mali Rural Electrification Program
<b>Version number of the PoA-DD</b>	12.0
<b>Completion date of the PoA-DD</b>	28/05/2021
<b>Coordinating/managing entity</b>	Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rurale (AMADER)
<b>Host Parties</b>	Republic of Mali
<b>Applied methodologies and standardized baselines</b>	AMS III.BL Version 1 Integrated methodology for electrification of communities  AMS-III.AR Version 5 Substituting fossil fuel based lighting with LED/CFL lighting systems
<b>Sectoral scopes</b>	Mandatory:  Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)  Conditional:  Not applicable

## PART I. Programme of activities (PoA)

### SECTION A. Description of PoA

#### A.1. Purpose and general description of PoA

##### Policy Measure/Stated Goal:

The objective of the proposed Programme of Activities (PoA) is to support a range of technologies and activities to provide electricity access to rural households in a sustainable way. The PoA includes the introduction of new solar PV mini-grid systems, hybrid solar PV/diesel mini-grid systems, installation of Solar Home Systems (SHS) and distribution of high quality solar lanterns when the cost of mini-grids' expansion is not economically justifiable, the installation of mini/micro hydro projects connected to mini-grids and the extension of the national grid.

The Malian rural electrification model is widely regarded as successful in the sub-region which has enabled the increase in the rural electrification rate from 1% in 2000 to 15% in 2013. When this achievement is seen as a significant, access to modern energy services remains very low in Mali, especially in rural areas. Access to electricity in Mali is estimated at 55% in urban areas and 15 % in rural towns and villages.<sup>1</sup>

To address the need for access to electricity for the majority of the Malian population who (about 70%) lives in rural areas and outside of the concession perimeter of Energie du Mali (EDM-SA), the national utility, the government has set new target in its energy policy to raise the rural electrification rate to 61% by 2033 and to increase the share of renewable energy in the national electricity mix to 25% over the same period.<sup>1</sup>

On the ground, this was translated into an ambitious rural energy access program to be implemented under the responsibility of the Agence Malienne pour le Developpement de l'Energie Domestique et de l'Electrification rurale (AMADER), the rural electrification agency.

To date the Mali rural electrification model has been largely a bottom-up model, driven by decisions from local private entrepreneurs/cooperatives to construct and operate micro-scale mini-grids in rural areas based on their perception of the local market. AMADER authorizes electricity prices adjustments in rural concessions where electricity prices are not regulated. The investments are subsidized through the Rural Electrification Fund managed by AMADER. In this public private partnership, the electricity tariffs are set to recover the private capital cost, the operation and maintenance costs, thus are passed to end-users.

Another dimension of the rural electrification is the extension of grid. The national network expansion will focus on: (i) expanding the distribution network in peri-urban areas, and (ii) connecting to the national grid isolated localities with a relatively high level of demand. Currently, the extension of the national grid is conducted by EDM. It is foreseen that private companies could be involved in last-mile rural electrification through grid extension.

##### Framework for Implementation of the PoA:

The PoA supports the implementation of a variety of technologies, including (1) new solar mini-grids and hybridized solar mini-grids, (2) solar lamps, (3) mini-hydroelectricity plants and (4)

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<sup>1</sup> African Development Bank. *Renewable Energy in Africa; Mali Country Profile*. Accessed on October 10<sup>th</sup> 2016 at [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Profil\\_ER\\_Mal\\_Web\\_light.pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Profil_ER_Mal_Web_light.pdf)

extension of existing grids. Each CPAs under the program will include a group of similar technologies whose aggregate installed capacity or emission reductions are equal to or below the CDM micro-scale thresholds at the CDM Unit level. The PoA implements these four (4) technology types through the following methodologies:

- AMS-III.BL Integrated methodology for electrification of communities Version 1
- AMS-III.AR Substituting fossil fuel based lighting systems with LED/CFL lighting systems Version 5

The PoA will implement four (4) different types of CPAs, namely:

- Solar PV Mini-Grids and Hybridized Mini-Grids under AMS-III.BL Integrated methodology for electrification of communities Version 1 (Type 1)
- Solar Lamps under AMS-III.AR Substituting fossil fuel based lighting systems with LED/CFL lighting systems Version 5 (Type 2)
- Mini-Hydropower Facilities under AMS-III.BL Integrated methodology for electrification of communities Version 1 (Type 3)
- Extension of Existing Power Grids under AMS-III.BL Integrated methodology for electrification of communities Version 1 (Type 4)

#### PoA as a Voluntary Action:

AMADER confirms that the PoA is a voluntary action. While the PoA will assist Mali in achieving its energy targets, achievement of these goals is not required by law. AMADER's involvement in the case of all technologies is not mandated by the Malian government. The experience with carbon finance operations may enable AMADER to raise concessional financing from other sources and use it to offer attractive financial products for the household renewable energy and energy efficiency sector, in the future.

#### Contribution of the PoA to Sustainable Development:

This PoA for off-grid renewable energy access is expected to contribute to sustainable development in rural Mali as follows:

- Develop hybridized mini-grids in hundreds of villages in Mali, distribute thousands of solar lamps and solar-pico systems, install several MW of hydro power capacity, and connect thousands of households to an electric grid
- Poverty reduction, by lowering households' expenditure for kerosene, and improving engagement in education by permitting more evening study time for students.
- Financial savings for the households from avoided fuel expenses in fossil fuel based mini-grids hybridized under the PoA
- Reduction in indoor air pollution due to soot from kerosene lamps, with resulting health benefits with respect to respiratory and eye diseases
- Strengthening of private sector involvement in renewable energy access, by providing the means for the private sector to become instrumental in the widespread sales of household and community-level renewable technologies in Mali

#### **A.2. Physical/geographical boundary of PoA**

The geographical boundary is the borders of the Republic of Mali. The program will be implemented across Mali, as shown in Figure 1 below.

Figure 1. Map of Mali<sup>2</sup>

### A.3. Technologies/measures

The technologies/measures employed under the PoA cover both grid connection, off-grid renewable energy, and solar powered efficient lighting technologies.

#### AMS-III.AR Version 5

Under small-scale methodology AMS-III.AR Version 5, the technology/measure employed covers battery-charged LED or CFL based lighting systems in residential and/or non-residential applications. CPAs under the PoA cover all Lighting-Africa certified solar lamps (with a rated capacity up to 10 MW). A summary of the product standards is available on the Lighting Africa website.<sup>3</sup>

In addition to the Lighting Africa standard, all lamps will meet or exceed the technical specifications below.

- a) Project lamps whose batteries are charged by a renewable energy system included as part of the project lamp (e.g. a photovoltaic system or mechanical system such as a hand crank charger).

<sup>2</sup> Central Intelligence Agency (US). *Africa:: Mali*. Accessed at <https://www.cia.gov/library/publications/the-world-factbook/geos/ml.html>

<sup>3</sup> Lighting Global. *Pico-PV Quality Standards*. Accessed at [https://www.lightingglobal.org/wp-content/uploads/2017/09/Pico\\_MQS\\_v8\\_0.pdf](https://www.lightingglobal.org/wp-content/uploads/2017/09/Pico_MQS_v8_0.pdf)

- b) The project lamps under the PoA will have a minimum rated average life of at least 10,000 hours as rated by the manufacturer. During the lifetime certified by the manufacturer the initial light output will decline by no more than 30%.
- c) Project lamps shall have a minimum warranty of 1 year which covers the free replacement or repair of any failed lamps, batteries, and where applicable solar panels.
- d) The project lamps shall at a minimum have a light output of 25 lumens or illuminance of 50 lux over an area greater than or equal to 0.1m<sup>2</sup> when suspended at a distance of 0.75 meters or self-supported.
- e) The Daily Burn Time (DBT) shall be equal or greater than 4 hours. And the autonomous time shall be equal to or greater than 200% than the DBT of the project lamps.

Each CPA shall list the proposed distribution methods for the project lamps, including explanations covering the following:

- a) Ensuring that any replaced baseline lamps directly consume fossil fuel;
- b) Encouraging consumers targeting by the project activity to use the project lamp and discourage hoarding;
- c) Eliminating potential double counting of emission reductions that could occur; and
- d) Ensuring compliance with prevailing regulations pertaining to the use and disposal of batteries.

Each CPA under the PoA will provide the minimum technical specification for project lamps under the CPA, covering:

- a) Lamp wattage (in watts) and luminous flux output (in lumens);
- b) Rated lamp life (in hours);
- c) The type and rated capacity of the renewable energy equipment used for battery charging (in Watts);
- d) Type, and rated capacity of the batteries;
- e) Type of charge controller;
- f) Autonomous time and DBT;
- g) Solar Run Times for products with solar energy charging systems;
- h) Physical protection against environmental factors.

### AMS-III.BL Version 1

Under small-scale methodology AMS-III.BL Version 1, the technology/measure employed covers the connection of consumers to a national/regional grid who were previously not connected to a grid, or consumers, who are supplied with electricity from a fossil fuel based individual energy system or fossil fuel based mini-grid prior to the implementation of the project, are supplied with electricity from the project activity (e.g. moving from a carbon intensive mini-grid to less carbon intensive grid or mini-grid). The consumers provided with electricity due to the project activity includes households, commercial facilities, and public services/buildings, collectively referred to as SMEs/institutions.

Under CPA Type 1, the project covers the construction of new solar PV or hybrid diesel/solar PV mini-grids, and the hybridization of existing diesel powered mini-grids through solar PV systems to reduce the carbon intensity of the mini-grid.

The baseline technology for CPA Type 1, prior to the commencement of the project activity, are diesel generators. The baseline technology under CPA Type 1 is a mini-grid powered by a diesel generator (Consumer Type III), stand-alone fossil fuel generators (Consumer Type II, or a combination of fuel based lighting and stand-alone fossil fuel generators (Consumer Type I). Consumer Type IV are not considered under the CPA.

Under CPA Type 3, the project covers the construction, commissioning and operation of hydro-power systems to provide electricity to end-users previously not connected to a power grid. The baseline technology under CPA Type 3 is either stand-alone fossil fuel generators (Consumer Type II and Type IV) or fuel based lighting, such as kerosene lamps, and fossil fuel generators (Consumer Type I).

Under CPA Type 4, the connections consist of a power line run from the closest transmission line, an installation of a meter to control the power used by the end-user, and possibly wiring of the end-user's household or institution/SME. The baseline technology under CPA Type 4 is either stand-alone fossil fuel generators (Consumer Type II and Type IV) or fuel based lighting, such as kerosene lamps, and fossil fuel generators (Consumer Type I).

At least 75% (by number) of the project consumers shall be households. The consumers connected under the project activity will have a mechanism in place to record the amount of electricity delivered to the consumers using meters that continuously measure electricity or through the billing records of consumers.

Each CPA covers emission reduction of less than or equal to 20,000 tCO<sub>2</sub> equivalent at the CDM Unit level, annually. For CPAs implementing AMS-III.BL Version 1 the summation of the emission reductions earned by technologies under each methodology cannot exceed 20,000 tCO<sub>2</sub> per annum at the CDM Unit level.

The CME will ensure training and capacity building is conducted to transfer technology know-how to the end-user. The CME will work with each CPA Implementer to transfer this knowledge. Where possible, the technologies/measures will be implemented by local staff or sourced from local manufacturers thereby transferring further know-how to the domestic industry of the host party.

#### A.4. Coordinating/managing entity

The CME of the PoA is the Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification rurale (AMADER). AMADER is a public governmental organization responsible for rural electrification in Mali.

A participant to the PoA is International Bank for Reconstruction and Development (IBRD) as trustee of the Carbon Initiative for Development (Ci-Dev). The IBRD is a multi-lateral, international financial institution.

#### A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mali (Host)	Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification rurale (AMADER) (CME)	No
Sweden	International Bank for Reconstruction and Development (IBRD) as trustee of the Carbon Initiative for Development (Ci-Dev)	No

#### A.6. Public funding of PoA

Public funding from Annex 1 countries may be used to provide funding for up-front costs related to CDM preparation.

Public funding from the Republic of Mali may cover a portion of the costs of implementation of CPAs under the PoA.

The statement on ODA funding is provided in the Annex I party LoA as Appendix 2.

## SECTION B. Management system

The CME uses a management system to ensure all CPAs under the PoA are implemented, operated, and monitored in an effective and verifiable manner. The management system covers the following aspects of the CPAs under the PoA:

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

The Management System is described below:

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

The program is managed by AMADER as the CME of the PoA. The CME will act as the CPA Implementer for some CPAs, but not necessarily all of them.

AMADER is responsible for reviewing proposed CPAs to be included under the PoA and will verify if the CPA meets the eligibility criteria of the PoA. AMADER has undergone extensive training in the CDM and its guidelines. The procedures for inclusion of a CPA are shown below.

**Table 1. CME Entities and Their Responsibilities Concerning Inclusion of a CPA**

Role	Responsibility	Competency
CME Program Manager	<ul style="list-style-type: none"> <li>- Manages the review process of the documentation submitted by the CPA implementer for inclusion of the proposed CPA</li> <li>- Notifies the CPA Implementer of acceptance or rejection of the proposed CPA</li> </ul>	<ul style="list-style-type: none"> <li>- Previous experience overseeing and implementing training and managing information databases</li> </ul>
CME Program Associate	<ul style="list-style-type: none"> <li>- Advises the CPA Implementer in the preparation of the required documentation for inclusion of the CPA under the PoA and performs the initial review of the documentation</li> <li>- Review UNFCCC database and CME's CPA database to no double-counting</li> </ul>	<ul style="list-style-type: none"> <li>- Technical degree in science or engineering</li> <li>- Previous experience with CDM activities</li> </ul>
CPA Implementer	<ul style="list-style-type: none"> <li>- Applies for inclusion of the CPA under the PoA to the CME by submitting the</li> </ul>	<ul style="list-style-type: none"> <li>- Previous experience</li> </ul>

	completed CPA-DD and all supporting material	implemented activities similar to those proposed in the CPA
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The roles and responsibilities concerning the management of the PoA and training activities are shown below.

**Table 2. CME Entities and Their Responsibilities Concerning Management and Training**

Role	Responsibility	Competency
CME Program Manager	<ul style="list-style-type: none"> <li>- Manage the electronic database and ensure the data collected on each CPA is of high quality and complete.</li> <li>- Continuously improve the training and support offered to partner organization implementing the CPAs</li> <li>- Communicate with the CDM EB</li> </ul>	<ul style="list-style-type: none"> <li>- Previous experience overseeing and implementing training and managing information databases</li> </ul>
CME Program Associate	<ul style="list-style-type: none"> <li>- Review the data collected on a weekly basis and ensure it is complete</li> <li>- Communicate with all partner organizations implementing the CPAs</li> <li>- Prepare monitoring reports</li> </ul>	<ul style="list-style-type: none"> <li>- Technical degree in science or engineering</li> <li>- Previous experience with CDM activities</li> </ul>
CME Field Personnel	<ul style="list-style-type: none"> <li>- Verify a sample of the data collected for newly established CPAs</li> <li>- Train the entities collecting the CPA data on the proper use of the electronic database and data management system.</li> </ul>	<ul style="list-style-type: none"> <li>- Knowledge of local culture and proficiency in local or national language as well as previous training to avoid bias and ensure neutrality when performing on the ground monitoring</li> </ul>
External QA/QC	<ul style="list-style-type: none"> <li>- Verify the monitoring work done to ensure accuracy before submission; review protocols, interview enumerators, spot check data</li> </ul>	Not applicable

The CME will ensure that all parties involved in the operation of the CPA are aware of and have agreed that their activity is being subscribed to the PoA. Awareness and agreement will be secured through informational material, community trainings and in contractual agreements. The CME will supply all contractual agreements and issue the CME Approval Letter if the CPA meets all eligibility criteria of the PoA. The CME is intimately familiar with the eligibility criteria of the PoA and the latest guidelines and standards of the CDM EB.

- b) Records of arrangement for training and capacity development for personnel;

#### Training of CPA Implementers

Training will be documented in the form of a training report and cover the main aspects of the implementation of CPAs under the PoA, including but not limited to the following:

- CME Management System
- Technological Requirements



- Sampling Plan (if any)
- Monitoring Methodology

A letter from the CPA Implementer confirming they have been trained and can implement the CPA will show completion of the training. The training will ensure that the project implementation and monitoring are unbiased and provide a conservative estimate of the CERs generated by the activity. The training will be continuously updated to ensure its effectiveness.

The responsibility for monitoring and reporting lies with the CME. Trained staff will be dedicated to carry out the monitoring process including data recording, reporting, archiving and management. The training will take place just before each CPA becomes operational. This is in order to ensure that the monitoring activity will take place exactly in accordance with the methodology and monitoring plan requirements and to guaranty a smooth verification and issuance process thereafter.

c) Review and Inclusion of CPAs

The CME will review the CPA Design Document and all appendixes to ensure the criteria for inclusion are met before including the CPA under the PoA. The CME will show that to the best of its knowledge that all criteria for inclusion have been met by issuing the CPA Implementer with a CME Approval letter.

If any of the required information above is not available or insufficient, the CME will notify the CPA Implementer and request the missing or insufficient information. In the event, the CPA Implementer cannot provide the requested information, the CME will notify the CPA Implementer that the proposed CPA cannot be included in the PoA.

The CME reserves the right to remove a CPA in the PoA if the CPA does not adhere to the management system and/or perform the necessary tasks required for monitoring of the CPA. The CME may remove the CPA and/or not pursue verification and issuance of CERs under said CPA.

- d) Procedures to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA);

Each CPA is required to meet eligibility criterion 6, measures to avoid double-counting. The CME's team also will check the described CPA against the UNFCCC database and the CME's CPA database to ensure no double-counting. The report from the CME technical team on CPA eligibility and double-counting will be provided by the Program Associate to the Program Manager for cross-check and final approval.

Following eligibility criterion 6, the technologies under each type of generic CPA (Type 1, 3, and 4) of the PoA will avoid double accounting of emissions reductions through unique identifiers, such as GPS coordinates. Grid connections, hybridized mini-grids, and hydropower facilities can be uniquely identified through GPS coordinates as they are fixed systems. A unique identifier showing clearly that they are not under another CDM activity will mark lamps distributed under AMS-III.AR Version 5 (Type 2). If there is any doubt regarding the identification of a product it will be excluded from the CPA. If a CPA does not satisfy eligibility criterion 6 it will not be included under the PoA.

Each CPA Implementer (for all CPA Types) will have an agreement covering CER ownership rights with the CME to ensure the CME has ownership of any CERs generated from the activity. This is as per the relevant eligibility criterion in the generic CPA.

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

The CME will operate and manage an electronic data management system that will store information on and track all or a fraction of technologies under the PoA.

The electronic data management system will include an overview of each CPA containing the following information:

- CPA Implementer
- CPA Title
- CPA Type
- Date of Inclusion of the CPA
- Start Date of the CPA
- CERs Earned to Date under the CPA
- Total Products Distributed or Installed under the CPA to Date

For each CPA, the system will contain the following information for hybridized and renewable solar PV mini-grids under AMS-III.BL Version 1 (CPA Type 1):

1. Unique Identification, such as GPS Coordinates
2. Contact details (name, organization, phone number and email) of implementing organization
3. Date of installation
4. Number and type of users connected (household or SME/institution)
5. Capacity of the project system
6. For Type III consumers, the characteristics of baseline mini-grid, such as capacity, load factor, and service hours of existing generator
7. Warranty information of the system

The system will contain the following information for off-grid solar power systems under AMS-III.AR Version 5 (CPA Type 2):

1. Date of sale
2. Type of lamp (i), charging mechanism (j), and serial number
3. Contact details of end-user or bulk purchaser (for example name, organization, phone number and email) of the end-user in case the technology requires maintenance, is moved to another address or transferred to another owner

For each CPA, the system will contain the following information for hydropower facilities under AMS-III.BL Version 1 (CPA Type 3):

1. Unique Identification, such as GPS Coordinates
2. Contact details (name, organization, phone number and email) of implementing organization
3. Date of installation
4. Number and type of users connected (household or SME/institution)
5. Capacity of the system

The system will contain the following information for grid-connections under AMS-III.BL Version 1 (CPA Type 4):

1. Unique Identification, such as GPS Coordinates
2. Contact details (name, organization, phone number and email) of the end-user in case the technology requires maintenance or is transferred to another owner
3. Date of connection
4. Type of user (household or SME/institution)
5. Load of the connection
6. For Type III consumers, the characteristics of baseline mini-grid, such as capacity, load factor, and service hours of existing generator

All data will be stored for at least two (2) years after the expiry of the crediting period (i.e. 12 years post start of the crediting period of the CPA).

Quality assurance and quality control procedures will be as specified in the individual parameter tables. The CME will be responsible for implementing QA/QC procedures in the management of the electronic database, to ensure data accuracy within the database.

The uncertainty levels, methods and the associated accuracy level of measuring instruments to be used for parameters will be as specified in the individual parameter tables.

Emergency procedures in the case of an inability to monitor in line with the monitoring plan will apply conservative assumptions, in line with up to date CDM standards.

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

The CME will at least every two years submit a performance review to each CPA Implementer assessing the performance of their CPAs under the PoA, communication with the CME, and requesting feedback on methods for improving the PoA management system based on the experiences of the CPA Implementer. The CME will evaluate the feedback and expand/revise the management system if deemed appropriate.

## **SECTION C. Demonstration of additionality of PoA**

The additionality of the PoA is demonstrated for each CPA using the CDM guidelines below.

There are no laws or regulations in the geographical/physical boundary of the PoA requiring the activities of the PoA. The activities under the PoA are a voluntary, coordinated action by the CME of the PoA.

The voluntary coordinated action implemented by the CME would not occur in absence of the PoA. The action is not financially viable without the support of revenues from the sale of CERs. Currently, rural electrification in Mali stands at 15 per cent and there are recognized barriers to increasing access to electricity in rural areas.<sup>4</sup> These barriers include economic barriers to rural consumers in accessing capital financing and energy service infrastructure, as well as barriers inhibiting widespread electricity service provision in rural areas such as relatively high unit cost of connecting the rural population due to low population density<sup>5</sup>. The actions under the PoA will alleviate these barriers by promoting grid extension, off-grid power, and solar lighting technologies through two methodologies.

Additionality of the CPAs under the PoA is demonstrated through *Methodological Tool 19 Demonstration of additionality of micro-scale project activities Version 8.0* as shown below.

The tool provides simplified modalities for demonstrating additionality for project activities that meet the following criteria:

- Type III: other project activities not included in Type I or Type II that aim to achieve GHG emission reduction at a scale of no more than 20 ktCO<sub>2</sub>e per year.

As per paragraph 10 of Tool 19, Type III project activities at a scale of no more than 20 ktCO<sub>2</sub>e per year are additional if any one of the following conditions is satisfied:

- a) The geographic location of the project activity is an LDC/SIDS or SUZ of the host country as identified by the government; and
- b) The project activity is an emission reduction activity with each independent subsystem (a 'microscale CDM Unit') equal to or less than 20,000 tCO<sub>2</sub>e per year and the end users of the subsystems or measures are households/communities/SMEs.

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<sup>4</sup> African Development Bank. *Renewable Energy in Africa; Mali Country Profile*. Accessed on October 10<sup>th</sup> 2016 at [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Profil\\_ER\\_Mal\\_Web\\_light.pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Profil_ER_Mal_Web_light.pdf)

<sup>5</sup> United Nations Development Programme. *Rural Electrification in Mali: Improving Energy Accessibility to the Rural Poor*. Accessed on March 14<sup>th</sup> 2016 at [http://www.africa-platform.org/sites/default/files/resources/mali\\_rural\\_electrification.pdf](http://www.africa-platform.org/sites/default/files/resources/mali_rural_electrification.pdf)

As all of the CPAs employ Type III methodologies, and the host country of the PoA is Mali, condition a) above applies as Mali is an LDC.<sup>6</sup>

For each CPA type, the respective CDM Unit is defined as follows:

CPA Type 1 – A CDM Unit is defined as a single, stand-alone hybridized mini-grid. No hybridized mini-grid will result in emission reductions exceeding 20,000 tCO<sub>2</sub>e per year.

CPA Type 2 – A CDM Unit is defined as a single solar lamp. No single solar lamp will result in emission reductions exceeding 20,000 tCO<sub>2</sub>e per year.

CPA Type 3 – A CDM Unit is defined as a single hydro-powered, stand-alone, mini-grid. No single hydro-powered mini-grid will result in emission reductions exceeding 20,000 tCO<sub>2</sub>e per year.

CPA Type 4 – A CDM Unit is defined as a single metered connection to a household or SME/Institution. No single metered connection will result in emission reductions exceeding 20,000 tCO<sub>2</sub>e per year.

The information presented here constitutes the demonstration of additionality of the PoA as a whole.

## **SECTION D. Start date and duration of PoA**

### **D.1. Start date of PoA**

The PoA start date is 08/10/2014 This is the date on which the CME officially notified the secretariat and the DNA(s) of the host Party(ies) of its intention to seek CDM status.<sup>7</sup>

### **D.2. Duration of PoA**

The duration of the PoA is 28 years and 0 months.

## **SECTION E. Environmental impacts**

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

The environmental analysis is undertaken at the PoA level to ensure that the impacts across all regions of the PoA are considered at the time of registration.

### **E.2. Analysis of environmental impacts**

The boundary of the PoA is Mali. An analysis was conducted by the Malian Ministry of Energy and Hydrology in conjunction with AMADER. The final report identifies the following environmental impacts and corresponding mitigation measures of the activity.<sup>8</sup> The Letter of Approval from the

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<sup>6</sup> United Nations Committee for Development Policy. *List of Least Developed Countries (as of June 2017)*. Accessed on October 10<sup>th</sup> 2017 at [https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/Ldc\\_list.pdf](https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/Ldc_list.pdf)

<sup>7</sup> [https://cdm.unfccc.int/Projects/PriorCDM/notifications/index\\_html](https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html)

<sup>8</sup> Mali EIA Assessment.pdf

Host country also states that the project is in line with the national policy on environmental protection.<sup>9</sup>

### Negative Impacts

Sources of negative impacts are mainly installation and implementation (operating) (i) of solar power plants, (ii) generators and (iii) extension of power lines. The solar plants may require land requirements for installation, which may lead to expropriation. The construction of power lines can cause pruning of trees and other plantations located on the route alignment. During construction, there is also the risk of construction accidents and traffic.

During this phase there is a risk of spill of sulfuric acid in the packaging of the batteries. At the social level, the risks include expropriation and losses socioeconomic assets located on the installation sites.

In the operational phase, potential problems are related to the current generation (fuel storage, noise generator and security system) and distribution facilities, the problems of waste generated by solar photovoltaic cells and panels used and waste oil generators, proximity to populated areas (noise pollution group) and considerations of security. The component 2 of SREP allows the installation of individual kits to meet potential customers when the network is congested it may cause a battery explosion or burns to the risks sulphuric acid.

### Mitigation Measures

For the most part, significant adverse impacts can be greatly reduced with the application (i) appropriate measures of planning (good location and landscaping equipment), (ii) environmental and social clauses relating to security, hygiene, the management of solid and liquid waste (batteries and waste oil) phase of works and operations and (iii) compensation for expropriation.

Environmental issues of the project area will require strengthening the environmental and social management measures by SREP following described: (i) institutional strengthening measures (Strengthening Environmental expertise AMADER, Direction Nationale des Eaux et Forêts and Private Operators) (ii) technical studies, audits and procedures (audits of existing facilities, facility maintenance manual), (iii) Training of actors involved in the implementation of the project; information and sensitization of communities and populations in the project area, (iv) Supervision, monitoring and evaluation of activities SREP.

Institutional arrangements for environmental and social monitoring of the implementation Monitoring and evaluation will be conducted as follows: (i) The supervision activities will be undertaken by officials of AMADER) (ii) Monitoring (internal close monitoring) performance measures environmental project will be managed by control offices, the Environment and Social responsible Operators and Private Communities (iii) the external monitoring will be conducted by the relevant government ministry and (iv) the evaluation will be carried out by independent consultants (mid-term and end of project).

In summary, the project was granted environmental approval by the Ministry for the Environment<sup>10</sup>. As a whole the activities under the PoA will benefit the environment and contribute to the sustainable development of the host country/countries.

## **E.3. Environmental impact assessment**

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<sup>9</sup> Translated LoA from Host Country.pdf

<sup>10</sup> EIA Letter from the Ministry.pdf

The Ministry of the Environment, Water, and Forests (Le Ministre D'Environnement, De L'Eau, et De L'Assainissement) issued a letter concerning the environmental impact assessment for the project. For the full environmental impact assessment see the EIA for the program.<sup>11</sup>

The Ministry of the Environment, Water, and Forests authorized the CME to undertake the project. The CME is required to follow and respect the application of measures to mitigate or compensate for any negative environmental impact.

The CME is required to implement the activity within the 3 year that follow the deliverance of the permit. After those 3 years, another permit will be required. The CME is required to undertake an EIA every 5 years.

## **SECTION F. Local stakeholder consultation**

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

The stakeholder consultation was undertaken at the PoA level.

### **F.2. Modalities for local stakeholder consultation**

Comments from local stakeholders are solicited at the PoA level to ensure comments/concerns from all regions covered by the PoA are included at the time of registration. There are no guidelines in the host country for inviting stakeholder comments for activities covered under the PoA.

A Local Stakeholder Consultation meeting was held in order to give stakeholders an opportunity to provide comments and inputs for the proposed programme. The meeting was held on 18/05/2016 at the Hotel Olympe in Bamako, Mali. Stakeholders from government, and relevant non-governmental organization and private sector actors were directly invited through invitation letters. An advert was published in the main newspaper on the 13/05/2016 inviting any interested parties to participate in the consultation.

At the closing of the meeting, a questionnaire was completed by the attendees of the stakeholder meeting to invite them to comment on the proposed programme. A sample questionnaire is shown in the Stakeholder Consultation Report<sup>12</sup>. Comments from stakeholders unable to attend the meeting were also invited by email and telephone as per the newspaper announcement, email invitations and the hand delivered invitations, as shown in the referenced report. No comments were submitted by local stakeholders directly to the DNA of the host party.

A total of 85 people participated in the stakeholder consultation meeting. Participants included NGOs, community representatives, the private sector, the media, research institutions, representatives of other efficient cooking stove projects, and members of the general public.

During the meeting a presentation was given to provide, first, an overview and update of the programme status including:


- Introduction to the programme and a background on AMADER
- The baseline situation in Mali
- The proposed measures/technologies to be implemented
- The proposed structure to implement the programme

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<sup>11</sup> Mali EIA Assessment.pdf

<sup>12</sup> Mali Local Stakeholder Consultation Report.pdf

Second, the presentation focused on the background and fundamentals of the CDM and how AMADER is expected to generate carbon credits. The presentation included the following points:

- An explanation of climate change
- Overview of the Kyoto Protocol
- Overview of the Clean Development Mechanism
- How the programme will result in emission reductions
- How the programme will develop and apply for carbon credits under the  CDM
- How the programme will benefit from carbon credits

The presentations were followed by a detailed questions and answer session with the participants of the meeting. Participants also provided their comments and inputs on the project in evaluation forms that were filled out at the end of the meeting.

A summary of the comments received and proposed consideration of the comments is shown below. A complete list of attendees and comments is shown in the Local Stakeholder Consultation (LSC) report.

### F.3. Summary of comments received

Stakeholders were given the opportunity to comment on the proposed programme at the meeting. Comments received by stakeholders were generally positive and most related to the implementation of the programme and how it will be structured. A summary of the comments received from the stakeholder consultation is shown below. No comments were forwarded by the DNA of the host party.

*a) Stakeholders from the non-governmental sector inquired about how the program will use carbon financing, how much revenue will be generated from carbon finance and what times will the carbon revenue pay for.*

*b) Stakeholders from the private sector inquired about the measures in place to ensure the technologies implemented under the program are of a high quality and perform reliably as there are several renewable energy technologies available in Mali that are of poor quality.*

*c) Stakeholders from the general public inquired about if the program for hybrid mini-grids can be extended beyond the scope proposed in the presentation, which covered 250 villages.*

*d) Stakeholders from the government commented on the need to accelerate the implementation of the program and inquired about the barriers remaining before the technologies can be implemented.*

A full list of the attendees is included in the attendance sheets.<sup>13</sup>

### F.4. Consideration of comments received

The comments received during the LSC were taken into consideration as shown below. There are no comments for consideration forwarded by the DNA of the host party.

*a) Stakeholders from the non-governmental sector inquired about how the program will use carbon financing, how much revenue will be generated from carbon finance and what times will the carbon revenue pay for.*

AMADER explained that the amount of carbon revenue isn't clear at this stage because the

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<sup>13</sup> Mali Local Stakeholder Attendance Sheets.pdf

revenue is received as carbon credits are earned and the volume and timing of issuance of carbon credits is uncertain. AMADER cited awareness and education programs of the technologies implemented under the program as an item to be financed along with supporting the management, implementation, and monitoring of these activities.

*b) Stakeholders from the private sector inquired about the measures in place to ensure the technologies implemented under the program are of a high quality and perform reliably as there are several renewable energy technologies available in Mali that are of poor quality.*

AMADER is limiting solar lamp technologies to those approved by the IFC's Lighting Africa Program which will ensure the quality of the lamps. For the remaining technology types, i.e. hybrid mini-grid systems, micro-hydro, and grid extension, AMADER will review the technologies on a case by case basis to ensure quality.

*c) Stakeholders from the general public inquired about if the program for hybrid mini-grids can be extended beyond the scope proposed in the presentation.*

AMADER explained that the organization has financing to cover the hybridization of mini-grids in 250 villages at the moment, but the project is meant to show that hybridization is a viable solution and ultimately promote the technology across Mali.

*d) Stakeholders from the government commented on the need to accelerate the implementation of the program and inquired about the barriers remaining before the technologies can be implemented.*

AMADER explained the process of registering a program under the CDM is lengthy and complex, and explained the process of validation and registration which need to be completed before the activity can be fully implemented.

## **SECTION G. Approval and authorization**

The letters of approval from both the host party (Mali) and the Annex I party (Sweden) are available at the time of submitting the PoA-DD.

Each project participant is authorized by at least one party involved in the PoA. The CME is authorized by the host party as per the host party LoA.

The Letter of Approval from the host country of Mali has been received.<sup>14</sup> The Letter of Approval from the Annex I party, Sweden, has been included as well.

A translated Letter of Approval has been provided as well.<sup>15</sup>

## **PART II. Generic component project activity (CPA)**

### **SECTION H. Description of generic CPA**

#### **H.1. Title of generic CPA**

Mali Rural Electrification Program – Grid Hybridization CPA

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<sup>14</sup> Lettre approbation 08-11-2016.pdf

<sup>15</sup> Translated LoA from Host Country.pdf



**H.2. Reference number of generic CPA**

Generic CPA Type 1

**H.3. Purpose and general description of generic CPA**

Type 1 CPAs cover activities that electrify rural communities through construction of new solar PV mini-grids and hybrid solar PV/diesel generator mini-grids, and hybridization of existing fossil fuel powered mini-grids through addition of solar PV systems. Under Type 1 CPAs, the CPA Implementer will operate the CPA under the PoA. In a generic Type 1 CPA the CME and CPA Implementer are the same entity. The CME/CPA Implementer will select and manage the distribution of technologies under Type 1 CPAs as well as oversee the data collection process for monitoring and verification. Mini-grid operators will hybridize the existing mini-grids and construct new hybrid or renewable solar PV mini-grids under the CPA, and work with the CME/CPA Implementer to collect the required end-user information. The purpose of the CPA is to provide access to electricity to households in the CPA boundary, which were not connected to a national/regional grid or a mini-grid (Type I), were connected to a stand-alone fossil fuel generator (Type II), used electricity generated from an existing mini-grid (Type III) prior to the project activity.

The CPA applies Type III small-scale methodology AMS-III.BL Version 1. The CPA is therefore a Type III CPA. The CPA also qualifies as a Type III microscale CPA. The CPA is implemented entirely in and LDC and the size of each CDM Unit, defined as a single solar PV or hybrid mini grid, is limited to emission reductions of 20,000 tCO<sub>2</sub>e or less per annum.

The CPA Implementer, CME, and various local partners work together to construct solar PV mini-grids and hybrid mini-grids and hybridize existing mini-grids within the CPA boundary. Carbon credit revenue through the sale of CERs is crucial to the sustainability of the programme.

The CPA Implementer adheres to the CME management system and provides the CME with information required to include the project activity under the PoA and perform monitoring and verification of the activity.

**H.4. Technologies/measures****Target Group**

Under Type 1 CPAs, the project activity targets households and SMEs/institutions in rural communities not connected to a national or regional grid, connected to a stand-alone fossil fuel generator, or connected to a fossil fuel powered mini-grid.

**Technology**

Under Type 1 CPAs, the rural communities will receive access to renewable energy through the implementation of solar photovoltaic systems. A description of technologies/measures to be employed by under each specific Type 1 CPA will be provided in the specific CPA document, including all technical specifications required by the applied methodology.

**CPA Boundary**

CPAs under Type 1 have a project boundary covering the solar PV mini-grid or hybridized mini-grid under the project activity as well as, any project distribution systems, and the physical sites of the consumer served by the project activity.

The geographic boundary of a Type 1 CPA is the Republic of Mali. Type 1 CPAs will be differentiated villages. No two villages will overlap in different Type 1 CPAs.

**Record Keeping System**

CPAs under Type 1 utilize an electronic monitoring system to record the electricity generated and distributed by the mini-grids under the project activity. The record keeping system to prove adherence to the management system detailed in Section B in the Part I, above.

CPAs under the PoA apply the following methodology:

- AMS-III.BL Integrated methodology for electrification of communities Version 1

## SECTION I. Application of selected methodologies and standardized baselines

### I.1. Reference to methodologies and standardized baselines

CPAs operating under the PoA, reference the following methodologies, tools, and guidelines:

- *AMS-III.BL Integrated methodology for electrification of communities Version 1.0*<sup>16</sup>
- *AMS-I.D Grid connected renewable electricity generation Version 18.0*<sup>17</sup>
- *AM0045 Grid connection of isolated electricity systems Version 3.0*<sup>18</sup>
- *Tool to calculate the emission factor for an electricity system Version 5.0*<sup>19</sup>
- *Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion Version 2.0*<sup>20</sup>
- *Tool 19 Demonstration of additionality of microscale project activities Version 8.0*<sup>21</sup>

### I.2. Applicability of methodologies and standardized baselines

Each Type 1 CPA under the PoA will implemented AMS-III.BL Integrated methodology for electrification of communities Version 1.

A Type 1 CPA under the PoA will implement new solar PV or hybridized mini-grids, and the hybridization of existing fossil fuel powered mini-grid through the installation of solar photovoltaic systems. The CPA is limited to emission reductions of 20,000 tCO<sub>2</sub>e per annum at the CDM Unit level, a single CDM Unit is defined as the entire mini-grid with solar photovoltaic systems and existing diesel fossil fuel generator, if existing.

**Table 3. Justification for the Choice of Methodology for CPA Type 1**

Methodology Paragraph	Applicability Conditions	Justification by the CPA
1	The methodology describes the scope of project activities under the methodology involving the displacement of fossil fuel use such as in fossil fuel based lighting system, stand-alone diesel generators, and diesel-based mini grids.	The proposed CPA involves the displacement of fossil fuel use through a reduction in fossil fuel based lighting system, stand-alone diesel generators, and diesel-based mini grids through renewable energy.
2	The methodology is applicable in situations where	The proposed CPA covers

<sup>16</sup> <https://cdm.unfccc.int/methodologies/DB/XJQ7APPRHQWLO6VSC3161I5Q8MCMNQ>

<sup>17</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

<sup>18</sup> <https://cdm.unfccc.int/methodologies/DB/UH7XSIREUC5C4QL5EU963O54CSFWGV>

<sup>19</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

<sup>20</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-03-v2.pdf>

<sup>21</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-19-v8.pdf>

	consumers that were supplied by a fossil fuel based mini-grid prior to the implementation of the project, are supplied with electricity from the project activity.	consumers connected to a fossil fuel based mini-grid, who will move from a carbon intensive mini-grid to less carbon intensive mini-grid as a result of the project activity.
3	The methodology is applicable in situations where consumers that were not connected to a national/regional grid, prior to project implementation are supplied with electricity generated from the project activity. It is also applicable in situation where a fraction of consumers that were supplied with electricity from a fossil based individual energy system or fossil fuel based mini-grid prior to the implementation of the project, are supplied with electricity from the project activity (i.e. moving from carbon intensive mini-grid to less carbon intensive mini grid).	The proposed CPA covers consumers that were not connected to a national/regional grid, prior to project implementation and are supplied with electricity generated from the project activity. It also covers consumers that were supplied with electricity from a fossil based individual energy system or fossil fuel based mini-grid prior to the implementation of the project and are supplied with electricity from the project activity.
4	As per paragraph 4 of the methodology, at least 75 per cent (by number) of the end-users connected to the national, regional, or mini-grid shall be households.	The type of end-user (i.e. household or SME/Institution) will be recorded at the time of connection. The electronic database will track the percentage of households versus SMEs/Institutions. If during monitoring it is found that the percentage of households (by number) under the CPA is less than 75%, SMEs/Institutions under the CPA will be removed from monitoring the monitoring period in question until the percentage of end-users (by number) is at least 75% households. This is further described in the monitoring plan.
5	As per paragraph 5d of the methodology, the methodology is applicable to project activities associated with national grids, regional grids, or mini-grids that utilize either fossil fuels or fossil fuels and renewable energy in the electricity system.	All connections under a CPA Type 1 cover electrification of communities through construction of new solar PV or hybrid mini-grids and hybridization of existing fossil fuel-powered mini-grids in the CPA boundary through installation of solar photovoltaic systems.
6	Project equipment shall comply with applicable international standards or comparable national, regional, or local standards/guidelines	The Type 1 CPA will specify the international, national, or regional standards/guidelines that the technology/measure

		under the CPA complies with.
7	For project involving the installation of hydro power plants with reservoirs the requirements prescribed under AMS-I.D shall be followed	The condition is not applicable to the proposed CPA as the project activity does not involve the installation of hydro power plants.
8	Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO <sub>2</sub> equivalent annually	Small-scale limit does not apply as each CPA will be below 20k tCO <sub>2</sub> per annum at the CDM Unit Level

The use of AMS-III.BL Version 1 to construct new solar PV mini-grids and hybrid solar PV/diesel mini-grids, as well as hybridize existing fossil fuel mini-grids through renewable energy technology, is thereby justified.

#### Qualification as Type III

The proposed CPA qualifies as a Type III project activity, as it covers activities not included under Type I or Type II and the small-scale limit does not apply as each CPA will be below 20k tCO<sub>2</sub> per annum at the CDM Unit Level.

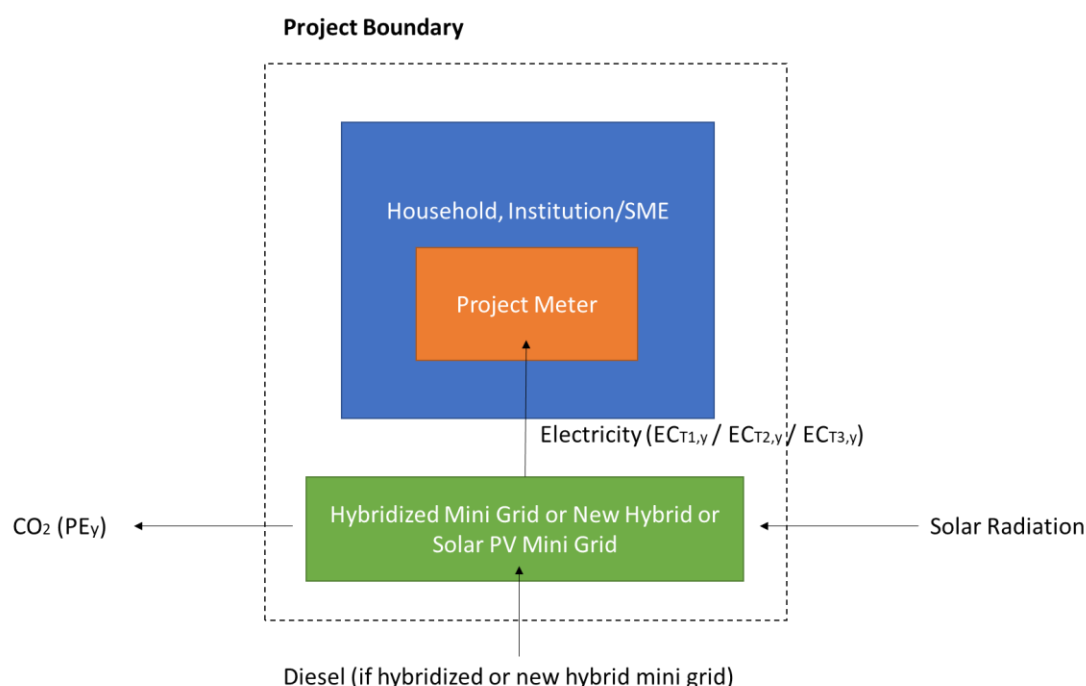
#### **I.3. Application of multiple methodologies**

The CPA only applied a single methodology.

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

	Source	GHG	Included?	Justification/Explanation
Baseline	Baseline Emissions	CO <sub>2</sub>	Yes	Major source of emissions
	(Emissions from the use of fossil fuel in the diesel-powered mini grid, or a combination of fuel based lighting and stand-alone fossil fuel generators)	CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available
	Project Emissions	CO <sub>2</sub>	Yes	Major source of emissions
	(Emissions from the use of fossil fuel in hybrid mini grids)	CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available

The diagram below delineates the CPA boundary, and includes all equipment, systems, and flows of mass and energy.



**Figure 2. Diagram from CPA Type 1**

In the diagram above, the electricity ( $EC_{T1,y}$ ,  $EC_{T2,y}$ ,  $EC_{T3,y}$ ) represents the electricity consumption by Tier 1, 2, and 3 consumers in the project scenario.

### I.5. Establishment and description of baseline scenario

Under the methodology, as per paragraph 20, the baseline scenario is determined by the type of consumer. The proposed CPA covers Type I, Type II, and Type III consumers. For Type III consumers, defined as “consumers who were connected to a mini-grid system prior to the project activity”. As such from Table 2 of the methodology, For Type III consumers the baseline scenario is generation from an existing mini-grid.

For Type III consumers, the baseline technology as described in section H.3 above is a mini-grid with 24-hour service powered by a diesel generator with a capacity greater than or equal to 135 kW but less than 200 kW. The default emission factor for this baseline technology is listed in Table 4 of the methodology as 0.9 tCO<sub>2</sub> per MWh. This value of 0.9 tCO<sub>2</sub> per MWh has been used in the sample calculation in section I.6.3 and for the projected emission reductions achieved under the CPA. However, the exact baseline emission factor for Type III consumers will be determined during monitoring for each mini-grid under the CPA. As the baseline scenario is a mini-grid, transmission losses are captured through the parameter  $TL_p$ , as per paragraph 44 of the methodology.

As such, the following parameters describe the baseline scenario under the proposed CPA.

**Table 4. Baseline Parameters for CPA Type 1**

Baseline Parameter	Description	Value	Source
$EF_{CO_2,T1}$	Emission Factor for Type I consumers	6.8, 1.3, 1.0	AMS-III.BL Version 1

EF <sub>CO<sub>2</sub>,T2</sub>	Emission Factor for Type II consumers	1.0	AMS-III.BL Version 1
EF <sub>CO<sub>2</sub>,T3</sub>	Emission Factor for Type III consumers	As per table 4 of the methodology (0.9 as selected from table 4 of the methodology for sample calculation)	AMS-III.BL Version 1
TL <sub>grid</sub>	Transmission losses in the project electricity system, where the project activity is grid extension. Does not apply to a mini-grid	0.0	AMS-III.BL Version 1
TL <sub>p</sub>	Local distribution losses in the project are	0.10	AMS-III.BL Version 1

In real case CPAs of Type 1, the baseline emission factor is applied as per the table above. Type I consumers will apply EF<sub>CO<sub>2</sub>,T1</sub> which depends on the annual power consumption as per paragraph 31 of AMS-III.BL Version 1.0. For Type II consumers EF<sub>CO<sub>2</sub>,T2</sub> is applied (shown in the table above) and for Type III consumers EF<sub>CO<sub>2</sub>,T3</sub> will be applied as per Table 4 of the methodology depending on the type of mini-grid available to end-users in the baseline scenario.

The mini-grid characteristics (Load Factor, Capacity) will be determined for each mini-grid covered by the project activity during monitoring, as per the monitoring plan of the real case CPA. It is anticipated that the most baseline mini-grids will have a 25% load factor and a capacity greater than or equal to 135 kW but less than 200 kW, resulting in a baseline emission factor of 0.9 for Type III consumers. For this reason, the value of 0.9 is used in the sample calculation.

As the emission reductions are determined based on the consumption of power in the project scenario, multiplied by default baseline emission factors listed above, suppressed demand is already reflected in the baseline emissions calculation and need not be considered further.

In the CPA boundary, there are neither national and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels, nor national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies, implemented before the adoption of the Kyoto Protocol (December 1997) or since the adoption of the CDM M&P (November 2001).

The Type 1 CPA will provide ex-ante estimations as per the applied methodology, as follows:

- The Type 1 CPA will provide ex-ante estimates of the number of consumers for each group or type and evidence these numbers with project documents; and;
- The Type 1 CPA will provide ex-ante estimates of consumption levels for each consumer type or sub-group within that type, as required, based on project documents.

## I.6. Estimation of emission reductions

### I.6.1. Explanation of methodological choices

Determination of baseline emissions:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T3,y} + BE_{T4,y} \quad \text{Equation (1)}$$

Where:

$BE_{T1,y}$	Baseline emissions for Type I consumers in year y (tCO <sub>2</sub> )
$BE_{T2,y}$	Baseline emissions for Type II consumers in year y (tCO <sub>2</sub> )
$BE_{T3,y}$	Baseline emission for Type III consumers in year y (tCO <sub>2</sub> )
$BE_{T4,y}$	Baseline emissions for Type IV consumers in year y (tCO <sub>2</sub> )

For Type I consumers,  $BE_{T1,y}$  is calculated as per the equation below.

$$BE_{T1,y} = \sum_{x=1}^N (EC_{T1,x,y} \times EF_{CO2,T1}) \quad \text{Equation (2)}$$

Where:

$BE_{T1,y}$	Baseline emission for Type I consumers in year y (tCO <sub>2</sub> )
$EC_{T1,x,y}$	Metered annual electricity consumption of Type I consumer x in year y (MWh)
$EF_{CO2,T1}$	Baseline emissions factor for Type I consumers (values as per consumption level in methodology AMS-III.BL Version 1.0)
$N_y$	Number of Type I consumers in year y
x	Type III consumer (x = 1, 2, 3, ...)

For Type II consumers,  $BE_{T2,y}$  is calculated as per the equation below.

$$BE_{T2,y} = \sum_{z=1}^M (EC_{T2,z,y} \times EF_{CO2,T2}) \quad \text{Equation (3)}$$

Where:

$BE_{T2,y}$	Baseline emission for Type II consumers in year y (tCO <sub>2</sub> )
$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer z in year y (MWh)
$EF_{CO2,T2}$	Baseline emissions factor for Type II consumers
$M_y$	Number of Type II consumers in year y
Z	Type II consumer (Z = 1, 2, 3, ...)

For Type III consumers,  $BE_{T3,y}$  is calculated as below.

$$BE_{T3,y} = \sum_{w=1}^P (EC_{T3,w,y} \times EF_{CO2,T3}) \quad \text{Equation (4)}$$

Where:

$BE_{T3,y}$	Baseline emission for Type III consumers in year y (tCO <sub>2</sub> )
$EC_{T3,w,y}$	Metered annual electricity consumption of Type III consumer w in year y (MWh)
$EF_{CO2,T3}$	Baseline emissions factor for Type III consumers
$P_y$	Number of Type III consumers in year y
w	Type III consumer (w = 1, 2, 3, ...)

Determination of project emissions:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (5)}$$

Where

$PE_{IS,y}$	Project emissions from new or rehabilitated individual renewable or hybrid energy systems in year y (tCO <sub>2</sub> )
$PE_{G,y}$	Project emission from renewable and hybrid mini-grids and grid extension in year y (tCO <sub>2</sub> )

Under Type 1 CPAs,  $PE_{IS,y}$  is zero as no new or rehabilitated individual renewable or hybrid energy systems will be installed.

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

Project emissions from renewable and hybrid mini-grids are calculated as follows:

$$PE_{G,y} = \frac{ES_{tot,y} \times EF_{grid,CO2,y}}{(1 - TL_{grid})} \quad \text{Equation (7)}$$

Where

$ES_{tot,y}$	Total electricity supplied to all new and existing consumers (MWh)
$EF_{grid,CO2,y}$	Emission factor of the project electricity system in year y (tCO <sub>2</sub> /MWh)
$TL_{grid}$	Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

The total electricity supplied to all new and existing consumers is calculated as follows:

$$ES_{tot,y} = \frac{\sum_{x=1}^{N_y} EC_{T1,x,y} + \sum_{z=1}^{M_y} EC_{T2,z,y} + \sum_{w=1}^{P_y} EC_{T3,w,y} + \sum_{i=1}^{Q_y} EC_{T4,i,y}}{(1 - TL_p)} \quad \text{Equation (8)}$$

Where

$ES_{tot,y}$	Total electricity supplied to all new and existing consumers (MWh)
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$EC_{T1,x,y}$	Metered annual electricity consumption of Type I consumer $x$ in year $y$ (MWh)
$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer $z$ in year $y$ (MWh)
$EC_{T3,i,y}$	Metered annual electricity consumption of Type III consumer $w$ in year $y$ (MWh)
$EC_{T4,i,y}$	Metered annual electricity consumption of Type III consumer $i$ in year $y$ (MWh)
$TL_p$	Local distribution losses within the project area (%), with 10 per cent as a default value

As Type 1 CPAs do not consider Type IV consumers,  $EC_{T4,i,y}$  is equal to 0.

A generic CPA determines leakage as per paragraph 45 of AM0045 Grid connection of isolated electricity systems Version 3:

$$LE_y = A_{def} * L_c \quad \text{Equation (9)}$$

Where

$LE_y$	Leakage emissions in year $y$ (tCO <sub>2</sub> e/y)
$A_{def}$	Area of land deforested in hectares
$L_c$	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO <sub>2</sub> per hectare

Emission reductions ( $ER_y$ ) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (10)}$$

Where:

$ER_y$	Emission reductions in year $y$ (tCO <sub>2</sub> e/y)
$BE_y$	Baseline emission in year $y$ (tCO <sub>2</sub> e/y)
$PE_y$	Project emissions in year $y$ (tCO <sub>2</sub> e/y)
$LE_y$	Leakage emissions in year $y$ (tCO <sub>2</sub> e/y)

#### I.6.2. Data and parameters fixed ex ante

Data / Parameter:	EF <sub>CO2,T1</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type I consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	6.8, 1.3, 1.0

Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T2</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type II consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T3</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type III consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	As per table 4 of the methodology
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data:	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>grid</sub>
Data unit:	-
Description:	Transmission and distribution losses in the project activity electricity system supplying the project activity (%)
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of project emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>p</sub>
Data unit:	-
Description:	Transmission and distribution losses within the project area
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.10
Choice of data or Measurement methods and procedures:	Default value from methodology

Purpose of data:	Determination of project emissions
Additional comment:	

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

Emission reductions for technologies/measures under AMS-III.BL Version 1 for a Type 1 CPA are calculated shown below. The equations and calculations for baseline emissions, project emissions, and leakage below will be applied to each Type 1 CPA under the PoA for each year of the crediting period. The sample calculation applies the equations to be used with sample values.

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (11)}$$

Where:

$ER_y$  Emission reductions in year  $y$  (tCO<sub>2</sub>e/y)

$BE_y$  Baseline emission in year  $y$  (tCO<sub>2</sub>e/y)

$PE_y$  Project emissions in year  $y$  (tCO<sub>2</sub>e/y)

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e/y)

Project emissions under CPA Type 1 are calculated as follows:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (12)}$$

Where:

$PE_{IS,y}$  Project emissions from new or rehabilitated individual renewable or hybrid energy systems in year  $y$  (tCO<sub>2</sub>)

$PE_{G,y}$  Project emission from renewable and hybrid mini-grids and grid extension in year  $y$  (tCO<sub>2</sub>)

Under Type 1 CPAs,  $PE_{IS,y}$  is zero as no new or rehabilitated individual renewable or hybrid energy systems will be installed.

Project emissions from renewable and hybrid mini-grids and grid extension are calculated as follows:

$$PEG,y = \frac{ES_{tot,y} \times EF_{grid,CO2,y}}{(1 - TL_{grid})} \quad \text{Equation (13)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EF_{grid,CO2,y}$  Emission factor of the project electricity system in year  $y$  (tCO<sub>2</sub>/MWh)

$TL_{grid}$  Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

The total electricity supplied to all new and existing consumers is calculated as follows:

$$ES_{tot,y} = \frac{\sum_{x=1}^{N_y} EC_{T1,x,y} + \sum_{z=1}^{M_y} EC_{T2,z,y} + \sum_{w=1}^{P_y} EC_{T3,w,y} + \sum_{i=1}^{Q_y} EC_{T4,i,y}}{(1 - TL_p)} \quad \text{Equation (14)}$$

Where:

$ES_{tot,y}$	Total electricity supplied to all new and existing consumers (MWh)
$EC_{T1,x,y}$	Metered annual electricity consumption of Type I consumer $x$ in year $y$ (MWh)
$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer $z$ in year $y$ (MWh)
$EC_{T3,i,y}$	Metered annual electricity consumption of Type III consumer $w$ in year $y$ (MWh)
$EC_{T4,i,y}$	Metered annual electricity consumption of Type III consumer $i$ in year $y$ (MWh)
$TL_p$	Local distribution losses within the project area (%), with 10 per cent as a default value

As Type 1 CPAs do not consider Type IV consumers,  $EC_{T4,i,y}$  is equal to 0.

Under a generic CPA leakage is calculated as follows:

$$LE_y = A_{def} * L_c \quad \text{Equation (15)}$$

Where:

$LE_y$	Leakage emissions in year $y$ (tCO <sub>2</sub> e/y)
$A_{def}$	Area of land deforested in hectares
$L_c$	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO <sub>2</sub> per hectare

Under a generic CPA, baseline emissions are calculated as follows:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T3,y} + BE_{T4,y} \quad \text{Equation (16)}$$

Where:

$BE_{T1,y}$	Baseline emissions for Type I consumers in year $y$ (tCO <sub>2</sub> )
$BE_{T2,,y}$	Baseline emissions for Type II consumers in year $y$ (tCO <sub>2</sub> )
$BE_{T3,y}$	Baseline emission for Type III consumers in year $y$ (tCO <sub>2</sub> )
$BE_{T4,y}$	Baseline emissions for Type IV consumers in year $y$ (tCO <sub>2</sub> )

For all Type 1 CPAs, all end-users will be metered to measure the electricity consumption ex-post.

### Sample Calculation

For the sample calculation below all consumers are connected to a hybridized mini-grid. Type I consumers had no previous connection to a national or mini-grid and consumed less than 500 kWh of electricity per year. Type II consumers either had a stand-alone generator and consumed less than 500 kWh per annum, or had no previous connection to a national or mini-grid and consumed more than 500 kWh per annum. Type III consumers were connected to the mini-grid prior to the hybridization of the grid. In the project scenario, all consumers are connected to the same hybridized mini-grid.

For the sample calculation for baseline emissions, it is assumed that the summation of electricity consumption by Type I consumers is as follows:

- Total consumption under 55 kWh is 2,000 kWh
- Total consumption between 55 kWh and 250 kWh is 3,000 kWh
- Total consumption between 250 kWh and 500 kWh is 4,000 kWh
- Total consumption above 500 kWh is 3,000 kWh

The emission factor for Type I consumers is tiered as shown above. Baseline emissions for Type I consumers are calculated as follows:

$$BE_{T1,y} = 2 \text{ MWh} * 6.8 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.3 \text{ tCO}_2/\text{MWh} + 4 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 24.5 \text{ tCO}_2$$

For Type II consumers the total consumption is assumed to be 3,000 kWh.

$$BE_{T2,y} = 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 3.0 \text{ tCO}_2$$

For the sample calculation for baseline emissions, it is assumed that the summation of electricity consumption by Type III consumers is 2,000 kWh. The emission factor for Type III consumers, is assumed to be 0.9 tCO<sub>2</sub>/MWh for the purpose of ex-ante calculations. The exact list of villages, including population, households, anticipated PV capacity, and other parameters will be provided in the specific CPA. It is assumed that the default baseline emission factor for the mini-grids in villages under the CPA is 0.9 tCO<sub>2</sub>/MWh, reflecting common use of a diesel generator in the baseline with a load factor of 25% and a capacity greater than or equal to 135 kW but less than 200 kW, as per table 4 of the methodology. The characteristics of the baseline generator for each village under the actual CPA will be determined during monitoring and the relevant value from table 4 of the methodology, applied.

Baseline emissions for Type III consumers are calculated as follows:

$$BE_{T3,y} = 2 \text{ MWh} * 0.9 \text{ tCO}_2/\text{MWh} = 1.8 \text{ tCO}_2$$

Baseline emissions from Type IV consumers under the CPA are not included under the project activity.

Total baseline emissions are then:

$$BE_y = 24.5 \text{ tCO}_2 + 3.0 \text{ tCO}_2 + 1.8 \text{ tCO}_2 + 0 \text{ tCO}_2 = 29.3 \text{ tCO}_2$$

As the project activity does not cover the construction of transmission lines but only low voltage distribution lines, the area of land deforested under the project activity is assumed to be zero. As such leakage is estimated to be 0.

Project emissions are calculated as follows:

$$PE_{G,y} = (17 \text{ MWh} * 0.045 \text{ tCO}_2/\text{MWh}) / (1 - 0) = 0.765 \text{ tCO}_2$$

Total electricity consumption is the summation of all Type I, Type II, and Type III consumers. This is 17 MWh.

For mini-grids transmission losses are considered 0. The emission factor of the mini-grid is assumed to be 0.045 tCO<sub>2</sub>/MWh based on the weighted average of the emissions based on the grid mix determines the emission factor. The emission factor of the diesel fuel is assumed to be 0.9 tCO<sub>2</sub>/MWh. The emission factor for the renewable energy from the solar photovoltaic system is 0.0 tCO<sub>2</sub>/MWh. For the sample calculation, it is assumed that 5% of the electricity from the hybrid mini-grid is from diesel. Given that the grid is 95% solar powered and 5% diesel fuel, with an emission factor of 0.9 CO<sub>2</sub>/MWh, the emission factor for the mini grid is determined as follows.

$$EF_{\text{grid,CO}_2,y} = (0.95 * 0.0 \text{ tCO}_2/\text{MWh} + 0.05 * 0.9 \text{ tCO}_2/\text{MWh}) / 1 = 0.045 \text{ tCO}_2/\text{MWh}$$

The resulting emission factor for the mini grid is 0.045 tCO<sub>2</sub>/MWh

$$ER_y = 29.3 \text{ tCO}_2 - 0.765 \text{ tCO}_2 - 0 = 28.535 \text{ tCO}_2$$

## I.7. Monitoring plan

### I.7.1. Data and parameters to be monitored

For the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.<sup>22</sup>

Therefore, this section is intentionally blank.

Data/Parameter	
Data unit	
Description	
Source of data	
Value(s) applied	
Measurement methods and procedures	
Monitoring frequency	
QA/QC procedures	
Purpose of data	
Additional comment	

### I.7.2. Sampling plan

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

### I.7.3. Other elements of monitoring plan

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<sup>22</sup> The decision to delay the development of the monitoring plan occurred during in person meeting in Bamako, Mali on 16/05/2016.

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

## SECTION J. Crediting period type and duration

The CPA has a fixed crediting period.

The length of the crediting period is 10 years and 0 months.

## SECTION K. Eligibility criteria for inclusion of CPAs

**Table 5. Eligibility Criteria for CPA Type 1**

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Technology	Each CPA covers the construction of new solar PV mini-grids or hybrid solar PV/diesel mini-grids, and hybridization of existing diesel-powered mini-grids through solar PV systems	Description of the technologies including expected lifetime, capacity (if applicable), load (if applicable) and any manufacturer certifications required by the methodologies
2	Location	Each CPA will be located within the physical/geographical boundary of the PoA.	Geographic reference showing the activity is within the physical/geographical boundary of the PoA
3	Additionality	Each CPA will use Methodological Tool 19, as each CPA is a micro-scale activity and located in and LDC	The CPA meets the criteria for additionality
4	Size Limit	Each CPA will apply the microscale threshold at the unit level, i.e. no single unit, defined as a single mini-grid will exceed 20 ktCO <sub>2</sub> e per year	The activity realizes emission reductions equal to or less than 20,000 per CDM Unit per annum from type III technologies
5	De-Bundling	Each CPA will demonstrate that debundling does not apply to the CPA as per the Methodical Tool 19	The CPA has demonstrated that debundling does not apply
6	Double Counting	Each CPA will utilize unique identifiers, such as GPS coordinates for every technology/measure under the CPA.	The unique identifier for each mini-grid will be available during installation and be collected along with adherence to the CME Manual

7	Start Date	Each CPA will prove that the start date of the CPA is on or after the start date of the PoA. The start date of the CPA is the date on which construction, implementation, or real action concerning the CPA, as shown through a contract detailing real action or an invoice for equipment.	The start date of the activity as shown through a purchase order, service agreement, or other type of contract included as a reference in the CPA-DD
8	Crediting Period	Each CPA will have a fixed crediting period.	The type of crediting period is fixed
9	Public Funding	Each CPA will confirm that it is not receiving funding dedicated as Official Development Assistance (ODA) through a two-stage process. The first stage is a check if the CPA is receiving public funding. If the CPA is not receiving public funding a statement from the CPA Implementer stating such is provided. If the CPA is receiving public funding a statement is required from the funder affirming that the public funding is not ODA.	A signed declaration that no public funding is used in the CPA, or a signed declaration that public funding used do not amount to diversion of official development assistance (ODA)
10	Methodology	Each CPA will apply the CDM baseline and monitoring methodology AMS-III.BL Version 1, and adhere to all applicability conditions and other requirements of the methodology. At least 75% of the end-users that receive electricity from systems installed under the CPA shall be households.	Application of CDM methodologies AMS-III.BL Version 1
11	Target Group	Each CPA targets households and institutions/SMEs not connected to a national/regional grid prior to the activity, or connected to a fossil fuel based mini-grid prior to the activity, who are provided with less carbon-intensive electricity as a result of the project activity.	Target groups are households or institutions/SMEs not connected to a national/regional grid prior to the activity, or connected to a fossil fuel based mini-grid prior to the activity, who are provided with less carbon-intensive electricity as a result of the project activity.



12	Stakeholder Consultation and Environmental Analysis	The Local Stakeholder Consultation and Environmental Impact Analysis have been conducted at the PoA level. Each CPA will take into consideration the comments from the Stakeholder Consultation and abide by the environmental regulations of the host country	Consideration of the comments from Local Stakeholder Consultation, and a statement that the CPA will adhere to the environmental regulations of the host country.
13	CER Ownership	The CPA Implementer will assure ownership of the CERs is secured by the CME	A statement by the CPA Implementer or mini-grid operator that it has yielded rights to any CERs to the CME.

## PART III. Generic component project activity (CPA)

### SECTION H. Description of generic CPA

#### H.1. Title of generic CPA

Mali Rural Electrification Program – Solar Lamps CPA

#### H.2. Reference number of generic CPA

Generic CPA Type 2

#### H.3. Purpose and general description of generic CPA

Type 2 CPAs cover activities that replace portable fossil fuel based lamps with battery-charged LED or CFL based lighting systems in residential or non-residential applications. Under Type 2 CPAs, the CPA Implementer will operate the CPA under the PoA The CME will act as the CPA Implementer. The CME/CPA Implementer will select and manage the distribution of technologies under Type 2 CPAs as well as oversee the data collection process for monitoring and verification. Manufacturers will produce the technologies distributed under the CPA and distributors will import and perform last mile distribution of technologies. The purpose of the CPA is to provide access to electricity to households in the CPA boundary through solar powered efficient lighting systems. All technologies under a Type 2 CPA will be Lighting Africa-certified and have a capacity equal to or less than 10W.

The CPA applies Type III small-scale methodology AMS-III.AR Version 5. The CPA is therefore a Type III CPA. The CPA also qualifies as a Type III microscale CPA. The CPA is implemented entirely in and LDC and the size of each CDM Unit, defined as a single solar lamp, is limited to emission reductions of 20,000 tCO<sub>2e</sub> or less per annum.

#### H.4. Technologies/measures

Target Group

Under Type 2 CPAs, the project activity targets households and SMEs/institutions, who will receive a battery-charged LED or CFL based lighting system.

#### Technology

Under Type 2 CPAs, the end-users will receive or gain access to a renewable energy technology that provides lighting services, is battery charged, and runs on solar power. A description of technologies/measures to be employed under a specific Type 2 CPA will be provided in the specific CPA document including all technical specifications required by the applied methodologies.

#### Distribution Mechanism

Under Type 2 CPAs, project technologies will be distributed through direct sales to end-users or bulk sales to distributors and retailers. The distribution method chosen in the specific CPA under Type 2 will depend on which method is best suited to the project activity.

#### CPA Boundary

CPAs under Type 2 have a project boundary the project lamps and the physical, geographical site of the renewable energy system. All project lamps that will be distributed or sold under the specific CPA are charged by renewable energy system.

The geographic boundary of a generic Type 2 CPA is the country of Mali.

#### Record Keeping System

CPAs under Type 2 utilize an electronic monitoring system to record the end-users who have purchased or received efficient lighting technologies. The record keeping system to prove adherence to the management system detailed in Section B in the Part I, above.

CPAs under the PoA apply following methodology:

- AMS-III.AR Substituting fossil fuel based lighting with LED/CFL lighting systems Version 5

The CPA Implementer, CME, and various local partners work together to disseminate a range of eligible technologies to households and institutions within the CPA boundary. Carbon credit revenue through the sale of CERs is crucial to the sustainability of the programme.

The CPA Implementer adheres to the CME management system and provides the CME with information required to include the project activity under the PoA, and perform monitoring and verification of the activity.

## **SECTION I. Application of selected methodologies and standardized baselines**

### **I.1. Reference to methodologies and standardized baselines**

Type 2 CPAs operating under the PoA, reference the following methodologies, tools, and guidelines:

- *AMS-III.AR Substituting fossil fuel based lighting with LED/CFL lighting systems Version 5.0*<sup>23</sup>
- *General guidelines for SSC CDM methodologies Version 22.1*<sup>24</sup>
- *Standard for sampling and surveys for CDM project activities and programme of activities Version 7.0*<sup>25</sup>

<sup>23</sup> <https://cdm.unfccc.int/methodologies/DB/4K7KI9GY79UEHUKF3140PCID64IXCV>

<sup>24</sup> [https://cdm.unfccc.int/filestorage/e/x/t/extfile-20160415160825656-Meth\\_guid25.pdf/Meth\\_guid25.pdf?t=Z1J8b3hkZXRjdBgryeelgRiX4ZKZss7dfDP](https://cdm.unfccc.int/filestorage/e/x/t/extfile-20160415160825656-Meth_guid25.pdf/Meth_guid25.pdf?t=Z1J8b3hkZXRjdBgryeelgRiX4ZKZss7dfDP)

- *Tool 19 Demonstration of additionality of microscale project activities Version 8.0<sup>26</sup>*

## I.2. Applicability of methodologies and standardized baselines

Type 2 CPAs under the PoA will implemented the following methodology:

1. AMS-III.AR Version 5 Substituting Fossil Fuel Based Lighting with LED/CFL Lighting Systems

The proposed CPA falls under Type III. The aggregate CPA size is limited to emission reductions less than or equal to 20,000 tCO<sub>2</sub>e per annum at the CDM Unit level.

**Table 6. Justification for the Choice of Methodology**

Methodology Paragraph	Applicability Conditions	Justification by the CPA
2	As per paragraph 2 of the methodology, the methodology comprises activities that replace portable fossil fuel based lamps with battery-charged light emitting diode or compact fluorescent lamps in residential and/or non-residential applications.	A Type 2 CPA seeks to distribute solar lamps to replace fossil fuel based lamps in residential and/or non-residential applications
3	As per paragraph 3, the methodology is applicable only if the project lamps' batteries are charged using one of the following options: <ol style="list-style-type: none"> <li>a) Charged by a renewable energy system included as part of the project lamp (e.g. a photovoltaic system or mechanical system such as a hand crank charger);</li> <li>b) Charged by a standalone distributed generation system (e.g. a diesel generator set) or a mini-grid, i.e. that is not connected to a national or regional grid;</li> <li>c) Charged by a grid that is connected to regional/national grid.</li> </ol>	A Type 2 CPA under the PoA will only implement project lamps whose batteries are charged using options a), a renewable energy system included as part of the project lamp.
4 - 9	Project lamps will satisfy the technical requirements listed under paragraphs 4 to 9 of the methodology.	<ul style="list-style-type: none"> <li>• At a minimum project lamps shall be certified by their manufacturer to have a rated capacity of 10,000 hours (as per Option 2 of paragraph 4 of the</li> </ul>

<sup>25</sup> <https://cdm.unfccc.int/Reference/Standards/index.html>

<sup>26</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-19-v8.pdf>

		<p>methodology), as an alternative project lamps shall not have a decrease in the relative luminous flux of more than 15 per cent during 2,000 hours of continuous use;</p> <ul style="list-style-type: none"> <li>• As only project lamps charged through option a) above are used the rated average life will be certified by the manufacturer or responsible vendor as being the time at which the lamp's initial light output will decline by no more than 30 per cent (paragraph 5);</li> <li>• Project lamps will meet the warranty requirements of the Lighting Global Minimum Quality Standard, i.e. have a minimum warranty of one year from the time the end-user takes ownership and the warranty shall cover free replacement or repair of any failed lamps, batteries, and solar panels, where applicable (paragraph 6);</li> <li>• Project lamps shall meet or exceed the minimum light output, Run Time, and Battery Capacity specified under paragraph 7;</li> <li>• Each CPA will explain and describe the proposed distribution method of the project lamps and explain how it is ensured that the replaced baseline lamps are those that directly consume fossil fuel, encourage consumers to use the project lamps and discourage hoarding, and ensure compliance with prevailing regulations pertaining to the use and disposal of the batteries (paragraph 8); and</li> <li>• Each CPA shall include the minimum requirements for the design specification of project lamps, including the specifications listed under paragraph 9 of the methodology.</li> </ul>
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The use of AMS-III.AR Version 5 to distribute solar-powered LED lighting systems is thereby justified.

For a generic Type 2 CPA, sampling will be used during monitoring to determine the emission reductions under a CPA. The sampling plan will meet the guidelines below.

- a) The sample size is determined by minimum 90 per cent confidence interval and the 10 per cent maximum error margin; the size of the sample shall be no less than 100;
- b) Sampling must be statistically robust and relevant, i.e. the survey has a random distribution and is representative of the target population (size, location);
- c) The method to select respondents for interviews is random;

The complete sampling guidelines will be provided at the first verification of a real case Type 2 CPA as the development of the monitoring and sampling plan has been delayed until the first verification as per I.7.2 below.

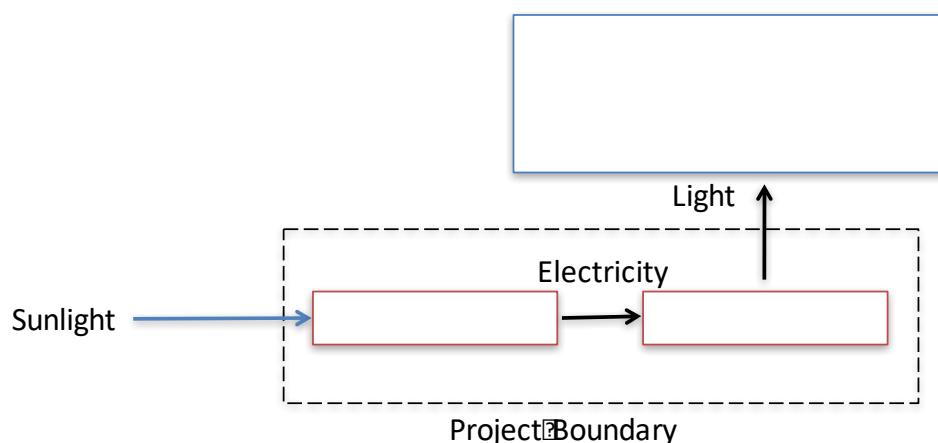
### I.3. Application of multiple methodologies

The CPA only applies a single methodology.

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

Source		GHG	Included?	Justification/Explanation
Baseline	Baseline Emissions (Use of kerosene in the baseline technology)	CO <sub>2</sub>	Yes	Major source of emissions
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available
	Project Emissions	CO <sub>2</sub>	No	Minor source of emissions and limited data available
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available

The diagram below delineates the CPA boundary, and includes all equipment, systems, and flows of mass and energy.



**Figure 3. Diagram for CPA Type 2**

### I.5. Establishment and description of baseline scenario

Under footnote 8 of the methodology if it is ensured that the replaced baseline lamps are those that directly consume fossil fuel as per paragraph 8a) of the methodology, it is assumed all baseline emissions are the consumption of fossil fuel burning for lighting. As per paragraph 8a), this can be done through documentation of the common practice of fuel usage for lighting in the project region (e.g. based on representative sample surveys, official data, or peer reviewed literature. Evidence of the baseline is shown through documentation from official data. In the PoA boundary, the country

of Mali, using kerosene for lighting is widespread.<sup>27</sup> As such, the baseline scenario, prior to the project activity, is the continued use of fossil fuel based lamps (e.g. wick-based kerosene lanterns).

**Table 7. Baseline Parameters for CPA Type 2**

Baseline Parameter	Description	Value	Source
DV	Lamp emission factor	0.092	AMS-III.AR. Version 5
GF <sub>y</sub>	Grid Factor in year y	1.0	AMS-III.AR. Version 5
DB <sub>y</sub>	Dynamic Baseline Factor in year y	1.0	AMS-III.AR. Version 5

The Dynamic Baseline Factor is fixed at 1.0 for the CPA as per Option 1 under paragraph 21 of the methodology.

As the emission reductions are determined based on the default usage and emission factors listed above, suppressed demand is already reflected in the baseline emissions calculation and need not be considered further.

In the CPA boundary, there are neither national and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels, nor national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies, implemented before the adoption of the Kyoto Protocol (December 1997) or since the adoption of the CDM M&P (November 2001).

## **I.6. Estimation of emission reductions**

### **I.6.1. Explanation of methodological choices**

This CPA includes only project lamps whose batteries are charged using a renewable energy system included as part of the project lamp, namely a photovoltaic system; this is in line with AMS-III.AR Version 5 para. 3(a). This is confirmed in Section K, criterion 1.

In line with AMS-III.AR Version 5 paragraph 4, this CPA will satisfy Option 2, therefore following paragraph 18 of the methodology: "Project lamps are assumed to operate for up to seven years after distribution to end- users, and thus emission reductions can be claimed for up to seven years per project lamp [...]" This option is permitted if several quality conditions are shown to be met. Compliance with these conditions is shown in Section K, criteria 2, 5, 11, 12, and 13.

All Type II CPAs will follow Paragraph 18 Option 2 of the methodology.

As per paragraph 28 of AMS-III.AR Version 5, surveys to determine the percentage of project lamps distributed to end-users that are operating and in service in a given year y is required. In the equations below, parameter  $OF_{y,i,j}$  represents the percentage of project lamps operating and in service in a given year y.

Baseline emissions are determined in line with paragraph 20 and 21 of AMS-III.AR Version 5.

$$DV = FUR * O * U * EF / 1000 * LF * n * NTG \quad \text{Equation (17)}$$

Where

DV    Lamp Emission Factor  
 FUR   Fuel use rate, L/hr  
 O     Utilization rate, hr/day

<sup>27</sup> International Monetary Fund. Energy Subsidy Reform in Sub-Saharan Africa: Experiences and Lessons. 2013. Page 36

***U*** Annual utilization, day/year  
***EF*** Fuel emissions factor, kgCO<sub>2</sub>/L  
***LF*** Leakage factor  
***n*** Number of fuel-based lamps replaced per project lamp  
***NTG*** Net-to-gross adjustment factor

$$BE_y = DV * GF_y * DB_y \quad \text{Equation (18)}$$

Where

***BE<sub>y</sub>*** Baseline emissions per project lamp in year *y* (t CO<sub>2</sub>e)  
***GF*** Grid Factor in year *y*, Equal to 1.0 since charging option defined in paragraph 3(a) is used  
***DB<sub>y</sub>*** Dynamic Baseline Factor (change in baseline fuel, fuel use rate, and/or utilization during crediting period) in year *y*, Option 1: default of 1.0 in the absence of relevant information

Project emissions are zero, following paragraph 23 of AMS-III.AR Version 5: "There are no project emissions (*PE<sub>y</sub>* = 0) if the project lamp charging mechanism utilized is as defined in: (a) Paragraph 3(a)."

Annual emission reductions are calculated as per paragraph 26, as follows. Emission reductions are considered from the date of distribution of the project lamps to end-users.

$$ER_y = \sum_{i,j} N_{i,j} * BE_{y,i} * OF_{y,i,j} \quad \text{Equation (19)}$$

Where

***ER<sub>y</sub>*** Emission reductions in year *y* (tCO<sub>2</sub>e)  
***N<sub>i,j</sub>*** Number of project lamps distributed to end users of lamp type *i* with charging method *j* = solar  
***OF<sub>y,i,j</sub>*** Percentage of project lamps distributed to end users that are operating and in service in year *y*, for each lamp type *i* and charging method *j*. Assumed to be equal to 100% for years 1, 2 and 3, and equal to the value determined in paragraph 30 for years 4, 5, 6 and 7

According to paragraph 30 of AMS-III.AR Version 5, for project lamps that will claim emission reductions for up to seven years, *ex-post* monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service will be conducted during the third year of the crediting period.

### I.6.2. Data and parameters fixed ex ante

<b>Data / Parameter:</b>	DV
Data unit:	tCO <sub>2</sub> per project lamp
Description:	Lamp Emission Factor
Source of data:	AMS-III.AR Version 5
Value(s) applied:	0.092
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	FUR
Data unit:	L/hour
Description:	Fuel Use Rate

Source of data:	AMS-III.AR Version 5
Value(s) applied:	0.03
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	O
Data unit:	Hours/day
Description:	Utilization Rate
Source of data:	AMS-III.AR Version 5
Value(s) applied:	3.5
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	U
Data unit:	Days/Year
Description:	Annual Utilization
Source of data:	AMS-III.AR Version 5
Value(s) applied:	365
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF
Data unit:	kgCO <sub>2</sub> /liter
Description:	Fuel Emissions Factor
Source of data:	AMS-III.AR Version 5
Value(s) applied:	2.4
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	n
Data unit:	-



Description:	Number of fuel-based lamps replaced per project lamp
Source of data:	AMS-III.AR Version 5
Value(s) applied:	1
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	GF,y
Data unit:	-
Description:	Grid Factor in year y
Source of data:	AMS-III.AR Version 5
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	Applicable to lamps that are charged with renewable energy

<b>Data / Parameter:</b>	LF
Data unit:	-
Description:	Leakage Factor
Source of data:	AMS-III.AR Version 5
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of leakage
Additional comment:	

<b>Data / Parameter:</b>	NTG
Data unit:	-
Description:	Net-to-gross adjustment factor
Source of data:	AMS-III.AR Version 5
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	DBy
Data unit:	-
Description:	Dynamic Baseline Factor in Year y
Source of data:	AMS-III.AR Version 5
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Methodology default value
Purpose of data	Calculation of baseline emissions
Additional comment:	Default value in absence of relevant information

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

The emission reductions generated per project lamp are:

$$\begin{aligned}
 DV &= FUR * O * U * EF / 1000 * LF * n * NTG \\
 &= 0.03 \text{ L/hr} * 3.5 \text{ hr/day} * 365 \text{ day/yr} * 2.4 \text{ kgCO}_2/\text{L} / 1000 * 1 * 1 * 1 \\
 &= 0.092 \text{ tCO}_2
 \end{aligned}
 \quad \text{Equation 20}$$

$$\begin{aligned}
 BE_y &= DV * GF_y * DB_y \\
 &= 0.092 \text{ tCO}_2 * 1.0 * 1.0 \\
 &= 0.092 \text{ tCO}_2
 \end{aligned}
 \quad \text{Equation 21}$$

Annual emission reductions for year 1 of the crediting period are:

$$\begin{aligned}
 ER_y &= \sum_{i,j} N_{i,j} * BE_{y,i} * OF_{y,i,j} \\
 &= [\text{Volume of Lamps}] * 0.092 \text{ tCO}_2 * [\text{Operating Fraction}] \\
 &= [\text{Emission Reductions}] \text{ tCO}_2
 \end{aligned}
 \quad \text{Equation 22}$$

#### Sample Calculation

For the sample calculation it is assumed that 1,000 full-time equivalent solar lamps are in operation during the monitoring period and the operating fraction is equal to 0.9.

$$ER_y = 1,000 * 0.092 \text{ tCO}_2 * 0.9 = 82.8 \text{ tCO}_2$$

### I.7. Monitoring plan

#### I.7.1. Data and parameters to be monitored

For the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.<sup>28</sup>

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<sup>28</sup> The decision to delay the development of the monitoring plan occurred during in person meeting with the CME in Bamako, Mali on 16/05/2016.

Therefore, this section is intentionally blank.

<b>Data / Parameter:</b>	
Data unit:	
Description:	
Source of data:	
Value(s) applied	
Measurement methods and procedures:	
Monitoring frequency:	
QA/QC procedures:	
Purpose of data	
Additional comment:	

### **I.7.2. Sampling plan**

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

### **I.7.3. Other elements of monitoring plan**

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

## **SECTION J. Crediting period type and duration**

The CPA has a fixed crediting period.

The length of the crediting period is 10 years and 0 months.

## **SECTION K. Eligibility criteria for inclusion of CPAs**

**Table 8. Eligibility Criteria for CPA Type 2**

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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1	Technology	Each CPA covers solar powered LED lighting systems to provide energy for lighting previously supplied through kerosene or other fossil fuels. Project lamps under each Type 2 CPA will preferably be charged through a solar panel or mechanical system. The lamp battery will be lithium-ion, with a passive charge controller. The project lamps will be certified by their manufacturer to have a rated operational life of at least 10,000 hours. The light output of the lamps will be at least 25 lumens or illuminance of 50 lux over an area equal to or greater than 0.1 m <sup>2</sup> when suspended from a distance of 0.75 meters or self-supported. The DBT of the lamps will be equal to or greater than 4 hours.	Description of the technologies any manufacturer certifications required by the methodologies
2	Location	Each CPA will be located within the physical/geographical boundary of the PoA.	Geographic reference showing the activity is within the physical/geographical boundary of the PoA
3	Additionality	Each CPA will use Methodological Tool 19, as each CPA is a micro-scale activity and located in an LDC	The CPA meets the criteria for additionality
4	Size Limit	Each CPA will apply the microscale threshold at the unit level, i.e. no single unit, defined as a single solar lamp will exceed 20 ktCO <sub>2</sub> e per year	The activity realizes emission reductions equal to or less than 20 ktCO <sub>2</sub> per CDM Unit per annum from type III technologies
5	De-Bundling	Each CPA will demonstrate that debundling does not apply to the CPA as per the Methodical Tool 19	The CPA demonstrates that debundling does not apply
6	Double Counting	Each CPA will utilize unique identifiers for every technology/measure under the CPA	A description of the unique identifier will be collected along with adherence to the CME Manual

7	Start Date	Each CPA will prove that the start date of the CPA is on or after the start date of the PoA. The start date of the CPA is the date on which construction, implementation, or real action concerning the CPA, as shown through a contract detailing real action or an invoice for equipment.	The start date of the activity as shown through a purchase order, service agreement, or other type of contract
8	Crediting Period	Each CPA will have a fixed crediting period	The type of crediting period is fixed
9	Public Funding	Each CPA will confirm that it is not receiving funding dedicated as Official Development Assistance (ODA) through a two-stage process. The first stage is a check if the CPA is receiving public funding. If the CPA is not receiving public funding a statement from the CPA Implementer stating such is provided. If the CPA is receiving public funding a statement is required from the funder affirming that the public funding is not ODA.	A statement that the activity is not receiving public funding or the public funding is not ODA
10	Methodology	Each CPA will apply the CDM baseline and monitoring methodology AMS-III.AR Version 5, and adhere to all applicability conditions and other requirements of the methodology	Application of CDM methodology AMS-III.AR Version 5
11	Target Group	Each CPA targets households and institutions/SMEs	Target groups are households or institutions
12	Stakeholder Consultation and Environmental Analysis	The Local Stakeholder Consultation and Environmental Impact Analysis have been conducted at the PoA level. Each CPA will take into consideration the comments from the Stakeholder Consultation and abide by the environmental regulations of the host country	Consideration of the comments from Local Stakeholder Consultation, and a statement that the CPA will adhere to the environmental regulations of the host country.

13	Distribution	Each CPA will use one or multiple of the following methods for distribution of appliances implemented under the CPA: <ol style="list-style-type: none"> <li>1. Direct sale/service to end-users</li> <li>2. Bulk sales to distributors who sell on to the end user</li> <li>3. Distribution to the end-user by an organization receiving the products/measures from the CME</li> </ol>	Description of the distribution method
14	Sampling	Each CPA will adhere to the sampling requirements stipulated in the PoA-DD	The CPA will provide a detailed sampling plan
15	CER Ownership	Each CPA will assure ownership of the CERs is secured by the CME	A statement by the CPA Implementer that it has yielded the rights to any CERs to the CME and that the CPA Implementer will ensure any distributors, manufacturers, or service providers cede their rights to the resulting CERs as well

## **PART IV. Generic component project activity (CPA)**

### **SECTION H. Description of generic CPA**

#### **H.1. Title of generic CPA**

Mali Rural Electrification Program – Hydro Power CPA

#### **H.2. Reference number of generic CPA**

Generic CPA Type 3

#### **H.3. Purpose and general description of generic CPA**

Type 3 CPAs cover activities that electrify rural communities through installation of hydro power systems. Under Type 3 CPAs, the CPA Implementer will operate the CPA under the PoA. In a generic Type 3 CPA the CME and CPA Implementer are the same entity. The CME/CPA Implementer will select and manage the distribution of technologies under Type 3 CPAs as well as oversee the data collection process for monitoring and verification. Hydro power facility operators will construct and operate the hydro power facility(ies) under the CPA and work with the CME/CPA Implementer to collect the required information. Type 3 CPAs will be differentiated by the time period covered under each CPA. The purpose of the CPA is to provide access to electricity to households and SMEs in the CPA boundary not connected to a national or regional grid prior to the activity.

The CPA applies Type III small-scale methodology AMS-III.BL Version 1. The CPA is therefore a Type III CPA. The CPA also qualifies as a Type III microscale CPA. The CPA is implemented entirely in and LDC and the size of each CDM Unit, defined as a single hydro power mini grid, is limited to emission reductions of 20,000 tCO<sub>2</sub>e or less per annum.

Consumers participating in the project activity will agree to the terms of the PoA and cede all rights to any CERs resulting from the PoA and to submit to the monitoring plan of the PoA.

The CPA Implementer, CME, and various local partners work together to hybridize mini-grids within the CPA boundary. Carbon credit revenue through the sale of CERs is crucial to the sustainability of the programme.

The CPA Implementer adheres to the CME management system and provides the CME with information required to include the project activity under the PoA, and perform monitoring and verification of the activity.

#### **H.4. Technologies/measures**

##### Target Group

Under Type 3 CPAs, the project activity targets households and SMEs/institutions in rural areas not connected to the national or regional grid.

##### Technology

Under Type 3 CPAs, the rural communities will receive access to renewable energy through the construction of hydro power facilities. A description of technologies/measures to be employed by

under each specific Type 3 CPA will be provided in the specific CPA document, including all technical specifications required by the applied methodology.

#### CPA Boundary

CPAs under Type 3 have a project boundary covering the hydro power facility(ies) as a result of the project activity as well as, any project distribution systems, and the physical sites of the consumer served by the project activity.

The geographic boundary of a Type 3 CPA is the Republic of Mali.

#### Record Keeping System

CPAs under Type 3 utilize an electronic monitoring system to record the electricity generated and distributed. The record keeping system to prove adherence to the management system detailed in Section B in the Part I, above.

CPAs under the PoA apply the following methodology:

- AMS-III.BL Version 1 Integrated methodology for electrification of communities

## **SECTION I. Application of selected methodologies and standardized baselines**

### **I.1. Reference to methodologies and standardized baselines**

CPAs operating under the PoA, reference the following methodologies, tools, and guidelines:

- *AMS-III.BL Integrated methodology for electrification of communities Version 1.0*<sup>29</sup>
- *AMS-I.D Grid connected renewable electricity generation Version 18.0*<sup>30</sup>
- *Tool to calculate the emission factor for an electricity system Version 5.0*<sup>31</sup>
- *Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion Version 2.0*<sup>32</sup>
- *Tool 19 Demonstration of additionality of microscale project activities Version 8.0*<sup>33</sup>

### **I.2. Applicability of methodologies and standardized baselines**

Each Type 3 CPA under the PoA will implemented AMS-III.BL Version 1 Integrated methodology for electrification of communities.

A Type 3 CPA under the PoA will construct and operate hydropower facilities to provide renewable energy to end-users not connected to a national or regional grid. The CPA is limited to emission reductions of 20,000 tCO<sub>2</sub>e per annum at the CDM Unit level.

**Table 9. Justification for the Choice of Methodology for CPA Type 3**

Methodology Paragraph	Applicability Conditions	Justification by the CPA
1	The methodology describes the scope of project activities under the methodology involving the displacement of fossil fuel use such as in fossil fuel based lighting system, stand-alone diesel	The proposed CPA involves the displacement of fossil fuel use through connection of consumers to a renewable

<sup>29</sup> <https://cdm.unfccc.int/methodologies/DB/XJQ7APPRHQWLO6VSC3161I5Q8MCMNQ>

<sup>30</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

<sup>31</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

<sup>32</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-03-v2.pdf>

<sup>33</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-19-v8.pdf>



	generators, and diesel-based mini grids.	energy mini-grid or regional grid.
2	The methodology is applicable in situations where consumers that were supplied by a fossil fuel based lighting systems, stand-alone diesel generator, and diesel based mini-grids prior to the implementation of the project, are supplied with electricity from the project activity.	The proposed CPA covers consumers not connected to a national or regional grid prior to the project activity, who are connected to a hydro powered mini grid or regional grid as part of the project activity.
3	The methodology is applicable in situations where consumers that were not connected to a national/regional grid, prior to project implementation are supplied with electricity generated from the project activity. It is also applicable in situation where a fraction of consumers that were supplied with electricity from a fossil fuel based individual energy system or fossil fuel based mini-grid prior to the implementation of the project, are supplied with electricity from the project activity (i.e. moving from carbon intensive mini-grid to less carbon intensive mini grid).	The proposed CPA covers consumers not connected to a national or regional grid prior to the project activity.
4	As per paragraph 4 of the methodology, at least 75 per cent (by number) of the end-users connected to the national, regional, or mini-grid shall be households.	The type of end-user (i.e. household or SME/Institution) will be recorded at the time of connection. The electronic database will track the percentage of households versus SMEs/Institutions. If during monitoring it is found that the percentage of households (by number) under the CPA is less than 75%, SMEs/Institutions under the CPA will be removed from monitoring the monitoring period in question until the percentage of end-users (by number) is at least 75% households. This is further described in the monitoring plan.
5	As per paragraph 5 of the methodology, the methodology is applicable to electrification of a community which is achieved through installation or extension of a mini-grid that distributes electricity generated from renewable energy systems or hybrid energy systems	The project activity covers the installation of hydropower facilities and mini-grids that will provide electricity to a community, which prior to the activity did not have access to a national or regional grid
6	Project equipment shall comply with applicable international standards or comparable national, regional, or local standards/guidelines	All equipment implemented under the project will abide by local or international guidelines as demonstrated in the CPA-DD
7	Hydro power plants with reservoirs shall follow the requirements of AMS-I.D. and satisfy at least one	Hydro power plants in a Type 3 CPA will meet a least one of

	of the following requirements: a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; b) The project activity is implemented in an existing reservoir, where the volume of the reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4W/m <sup>2</sup> ; c) The project activity results in new reservoirs and the power density of the power plans, as per definitions given in the project emissions section, is greater than 4W/m <sup>2</sup> .	the requirements specified.
8	Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO <sub>2</sub> equivalent annually	Small-scale limit does not apply as each CPA will be below 20k tCO <sub>2</sub> per annum at the CDM Unit Level

The use of AMS-III.BL Version 1 to provide renewable energy to end-users previously not connected to a national or regional grid is thereby justified.

#### Qualification as Type III Methodology

The proposed CPA qualifies as a Type III project activity, as it covers activities not included under Type I or Type II and the small-scale limit does not apply as each CPA will be below 20k tCO<sub>2</sub> per annum at the CDM Unit Level.

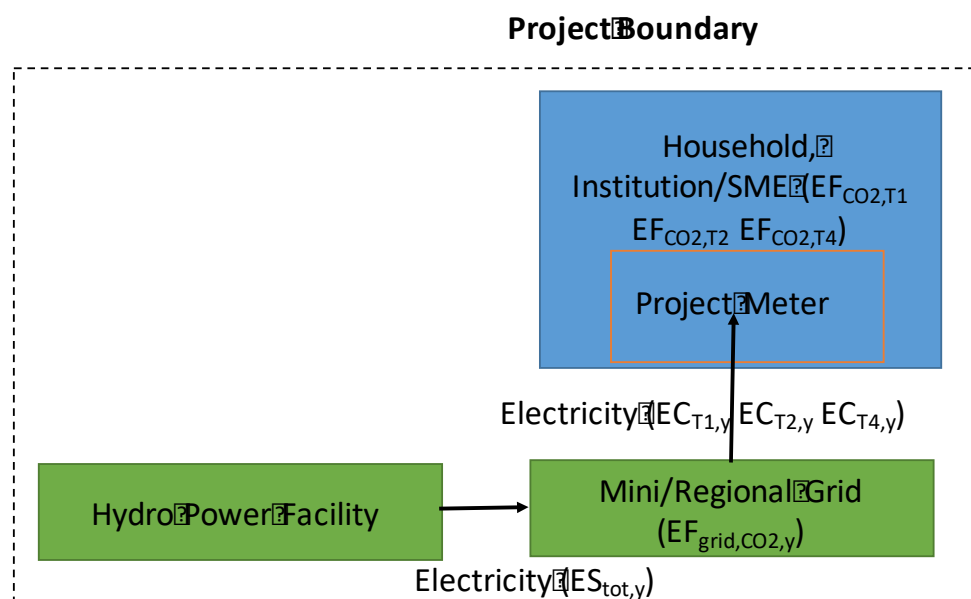
### **I.3. Application of multiple methodologies**

The CPA only applies a single methodology.

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

	Source	GHG	Included?	Justification/Explanation
Baseline	Baseline Emissions (Use of fossil fuels)	CO <sub>2</sub>	Yes	Major source of emissions
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available
	Project Emissions Baseline Emissions (Use of fossil fuels)	CO <sub>2</sub>	No	Minor source of emissions and limited data available
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available

The diagram below delineates the CPA boundary, and includes all equipment, systems, and flows of mass and energy.



**Figure 4. Diagram for CPA Type 3**

As the hydro power facilities are a source of renewable energy,  $EF_{grid,CO2,y}$  is equal to 0 and project emissions are considered 0.

#### **I.5. Establishment and description of baseline scenario**

Under the methodology, as per paragraph 20, the baseline scenario is determined by the type of consumer. The proposed CPA covers Type I, Type II, and Type IV consumers.

Type I consumers represent a baseline scenario of a combination of fossil fuel-based lighting and stand-alone fossil fuel generators. Type II and Type IV consumers represent a baseline of stand-alone fossil fuel generators, as per paragraph 22 of the methodology.

The baseline technology as described in section P.3 above is a stand-alone fossil fuel generators or fossil fuel based lighting systems.

As such, the following parameters describe the baseline scenario under the proposed CPA.

Under Type 3 CPAs, small-scale methodology AMS-III.BL Version 1 covers the connection of consumers to a national/regional grid who prior to the project activity were not connected to a national/regional grid.

According to AMS-III.BL Version 1, the baseline scenario is the use of fossil fuels, such as in fossil fuel-based lighting systems and stand-alone generators.

**Table 10. Baseline Parameters for CPA Type 3**

Baseline Parameter	Description	Value	Source
$EF_{CO2,T2}$	Emission Factor for Type II consumers	1.0	AMS-III.BL Version 1

EF <sub>CO2,T1</sub>	Emission Factor for Type I consumers	6.8, 1.3, 1.0	AMS-III.BL Version 1
EF <sub>CO2,T4</sub>	Emission Factor for Type IV consumers	1.0	AMS-III.BL Version 1
TL <sub>grid</sub>	Transmission losses in the project electricity system, where the project activity is grid extension. Does not apply to a mini-grid	0.0	AMS-III.BL Version 1
TL <sub>p</sub>	Local distribution losses in the project are	0.10	AMS-III.BL Version 1

As the emission reductions are determined based on the consumption of power in the project scenario, multiplied by default baseline emission factors listed above, suppressed demand is already reflected in the baseline emissions calculation and need not be considered further.

In the CPA boundary, there are neither national and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels, nor national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies, implemented before the adoption of the Kyoto Protocol (December 1997) or since the adoption of the CDM M&P (November 2001).

## I.6. Estimation of emission reductions

### I.6.1. Explanation of methodological choices

Determination of baseline emissions:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T4,y} \quad \text{Equation (23)}$$

Determination of project emissions:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (24)}$$

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

Project emissions from renewable or hybrid mini grids are calculated as follows:

$$PEG_y = \frac{ES_{tot,y} \times EF_{grid,CO2,y}}{(1 - TL_{grid})} \quad \text{Equation (25)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EC_{T3,w,y}$  Metered annual electricity consumption of Type III consumer  $w$  in year  $y$  (MWh)

$TL_{grid}$  Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

The total electricity supplied to all new and existing consumers is calculated as follows, as only Type I, Type II, and Type IV consumers are considered under the CPA:

$$ES_{tot,y} = \frac{\sum_{x=1}^{Ny} EC_{T1,x,y} + \sum_{z=1}^{My} EC_{T2,z,y} + \sum_{i=1}^{Qy} EC_{T4,i,y}}{(1 - TL_p)} \quad \text{Equation (26)}$$

Where

$ES_{tot,y}$	Total electricity supplied to all new and existing consumers (MWh)
$EC_{T1,x,y}$	Metered annual electricity consumption of Type I consumer x in year y (MWh)
$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer z in year y (MWh)
$EC_{T4,i,y}$	Metered annual electricity consumption of Type IV consumer i in year y (MWh)
$TL_p$	Local distribution losses within the project area (%), with 10 per cent as a default value

A generic CPA determines leakage as per AM0045 Grid connection of isolated electricity systems Version 3:

$$LE_y = A_{def} * L_c \quad \text{Equation (27)}$$

Where

$LE_y$	Leakage emissions in year y (tCO <sub>2</sub> e/y)
$A_{def}$	Area of land deforested in hectares
$L_c$	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO <sub>2</sub> per hectare

Emission reductions (ER<sub>y</sub>) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (28)}$$

Where

$ER_y$	Emission reductions in year y (tCO <sub>2</sub> e/y)
$BE_y$	Baseline emission in year y (tCO <sub>2</sub> e/y)
$PE_y$	Project emissions in year y (tCO <sub>2</sub> e/y)
$LE_y$	Leakage emissions in year y (tCO <sub>2</sub> e/y)

#### 1.6.2. Data and parameters fixed ex ante

<b>Data / Parameter:</b>	EF <sub>CO2,T1</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type I consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	6.8, 1.3, 1.0

Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T2</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type II consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T4</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type IV consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>grid</sub>
Data unit:	-
Description:	Transmission and distribution losses in the project activity electricity system supplying the project activity (%)
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of project emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>p</sub>
Data unit:	-
Description:	Transmission and distribution losses within the project area
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.1
Choice of data or Measurement methods and procedures:	Default value from methodology

Purpose of data	Determination of project emissions
Additional comment:	

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

Emission reductions for technologies/measures under AMS-III.BL Version 1 for a Type 3 CPA are calculated shown below. The equations and calculations for baseline emissions, project emissions, and leakage below will be applied to each Type 3 CPA under the PoA for each year of the crediting period. The sample calculation applies the equations to be used with sample values.

Baseline emission values are determined for each consumer type as per the baseline for each consumers in the methodology. The table in section Q.5 of the Type 3 generic CPA, above shows the baseline emission factors from the methodology for the different consumer types.

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (29)}$$

Where:

$ER_y$  Emission reductions in year  $y$  (tCO<sub>2</sub>e/y)

$BE_y$  Baseline emission in year  $y$  (tCO<sub>2</sub>e/y)

$PE_y$  Project emissions in year  $y$  (tCO<sub>2</sub>e/y)

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e/y)

Project emissions under CPA Type 3 are calculated as follows:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (30)}$$

Where:

$PE_{IS,y}$  Project emissions from new or rehabilitated individual renewable or hybrid energy systems in year  $y$  (tCO<sub>2</sub>)

$PE_{G,y}$  Project emission from renewable and hybrid mini-grids and grid extension in year  $y$  (tCO<sub>2</sub>)

$$PE_{G,y} = \frac{ES_{tot,y} \times EF_{grid,CO_2,y}}{(1 - TL_{grid})} \quad \text{Equation (31)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EF_{grid,CO_2,y}$  Emission factor of the project electricity system in year  $y$  (tCO<sub>2</sub>/MWh)

$TL_{grid}$  Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

Total electricity supplied is calculated as:

$$ES_{tot,y} = \frac{\sum_{x=1}^{Ny} EC_{T1,x,y} + \sum_{z=1}^{My} EC_{T2,z,y} + \sum_{i=1}^{Qy} EC_{T4,i,y}}{(1-TL_p)}$$

Equation (32)

Where:

$ES_{tot,y}$	Total electricity supplied to all new and existing consumers (MWh)
$EC_{T1,x,y}$	Metered annual electricity consumption of Type I consumer x in year y (MWh)
$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer z in year y (MWh)
$EC_{T4,i,y}$	Metered annual electricity consumption of Type IV consumer i in year y (MWh)
$TL_p$	Local distribution losses within the project area (%), with 10 per cent as a default value

Under a generic CPA leakage is calculated as follows:

$$LE_y = A_{def} * L_c$$

Equation (33)

Where:

$LE_y$	Leakage emissions in year y (tCO <sub>2</sub> e/y)
$A_{def}$	Area of land deforested in hectares
$L_c$	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO <sub>2</sub> per hectare

Under a generic CPA, baseline emissions are calculated as follows:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T4,y}$$

Equation (34)

Where:

$BE_{T1,y}$	Baseline emissions for Type I consumers in year y (tCO <sub>2</sub> )
$BE_{T2,y}$	Baseline emissions for Type II consumers in year y (tCO <sub>2</sub> )
$BE_{T4,y}$	Baseline emissions for Type IV consumers in year y (tCO <sub>2</sub> )

For all Type 3 CPAs, all end-users will be metered to measure the electricity consumption ex-post.

Baseline emissions for Type I consumers are calculated as follows:

$$BE_{T1,y} = \sum_{x=1}^N (EC_{T1,x,y} \times EF_{CO2,T1})$$

Equation (32)

Where:



$EC_{T1,x,y}$  Annual electricity consumption of Type I consumer x in year y (MWh)

$EF_{CO2,T1}$  Emission factor for Type I consumers:

- If the electricity consumed during year y is equal to or less than 0.055 MWh/y, then use a default value of 6.8
- If the electricity consumed during year y is less than or equal to 0.25 MWh/y but greater than 0.055 MWh/y then for the portion up to and including 0.055 MWh/y, use a default value of 6.8 and for the portion greater than 0.055 MWh/y, use a default value of 1.3
- If the electricity consumed during year y is greater than 0.25 MWh/y but less than 0.500 MWh/y then for the portion up to and including 0.055 MWh/y, use a default value of 6.8, for the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3, and for the portion greater than 0.25 MWh/y use a default value of 1.0.
- If the electricity consumed is greater than 0.500 MWh/y then use a default value of 1.0 for the entire portion

$N_y$  Number of Type I consumers in year y

x Type I consumer (x = 1, 2, 3, ...)

Baseline emissions for Type II consumers are calculated as follows:

$$BE_{T2,y} = \sum_{z=1}^M (EC_{T2,z,y} \times EF_{CO2,T2}) \quad \text{Equation (35)}$$

Where:

$EC_{T2,z,y}$  Metered annual electricity consumption of Type II consumer z in year y (MWh)

$EF_{CO2,T2}$  Baseline emission factor for Type II consumers (1.0 tCO<sub>2</sub>/MWh)

$M_y$  Number of Type II consumers in year y

z Type I consumer (z= 1, 2, 3, ...)

Baseline emissions for Type IV consumers are calculated as follows:

$$BE_{T4,y} = \sum_{i=1}^Q (EC_{T4,i,y} \times EF_{CO2,T4}) \quad \text{Equation (36)}$$

Where:

$EC_{T4,q,y}$  Metered annual electricity consumption of Type IV consumer i in year y (MWh)

$EF_{CO2,T4}$  Baseline emissions factor for Type IV consumers (1.0 tCO<sub>2</sub>/MWh)

$Q_y$  Number of Type IV consumers in year y

i Type IV consumer (i= 1, 2, 3, ...)

Sample Calculation

For the sample calculation for baseline emissions, it is assumed that the summation of electricity consumption by Type I consumers is as follows:

- Total consumption under 55 kWh is 2,000 kWh
- Total consumption between 55 kWh and 250 kWh is 3,000 kWh
- Total consumption between 250 kWh and 500 kWh is 4,000 kWh
- Total consumption above 500 kWh is 3,000 kWh

The emission factor for Type I consumers is tiered as shown above. Baseline emissions for Type I consumers are calculated as follows:

$$BE_{T1,y} = 2 \text{ MWh} * 6.8 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.3 \text{ tCO}_2/\text{MWh} + 4 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 24.5 \text{ tCO}_2$$

For Type II consumers the total consumption is assumed to be 3,000 kWh.

$$BE_{T2,y} = 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 3.0 \text{ tCO}_2$$

For Type IV consumers the total consumption is assumed to be 4,000 kWh.

$$BE_{T4,y} = 4 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 4 \text{ tCO}_2$$

Total baseline emissions are then:

$$BE_y = (24.5 + 3 + 0 + 4) \text{ tCO}_2 = 31.5 \text{ tCO}_2$$

Emissions from Type III consumers under the CPA are not included under the project activity.

For the purpose of the sample calculation leakage is assumed to be less than 5% of total project emissions and therefore negligible.

Project emissions are calculated as follows:

$$PE_{G,y} = (19 \text{ MWh} * 0.0 \text{ tCO}_2/\text{MWh}) / (1 - 0.0) = 0.0 \text{ tCO}_2$$

The emission factor of the mini-grid is assumed to be 0.0 tCO<sub>2</sub>/MWh as stated above. For the sample calculation, it is assumed that all of the electricity is from hydro power.

$$ER_y = 31.5 \text{ tCO}_2 - 0 \text{ tCO}_2 - 0 \text{ tCO}_2 = 31.5 \text{ tCO}_2$$

## **I.7. Monitoring plan**

### **I.7.1. Data and parameters to be monitored**

For the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.<sup>34</sup>

Therefore, this section is intentionally blank.

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<sup>34</sup> The decision to delay the development of the monitoring plan occurred during in person meeting in Bamako, Mali on 16/05/2016.

<b>Data / Parameter:</b>	
Data unit:	
Description:	
Source of data:	
Value(s) applied	
Measurement methods and procedures:	
Monitoring frequency:	
QA/QC procedures:	
Purpose of data	
Additional comment:	

### I.7.2. Sampling plan

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

### I.7.3. Other elements of monitoring plan

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

## SECTION J. Crediting period type and duration

The CPA has a fixed crediting period.

The length of the crediting period is 10 years and 0 months.

## SECTION K. Eligibility criteria for inclusion of CPAs

**Table 11. Eligibility Criteria for CPA Type 3**

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Technology	Each CPA covers the installation of hydro powered mini grid systems within the CPA boundary. Each CDM Unit shall not exceed a total capacity of 5 MW.	Description of the technologies including expected lifetime, capacity (if applicable), load (if applicable) and any manufacturer certifications required by the methodologies are attached
2	Location	Each CPA will be located within the physical/geographical boundary of the PoA.	Geographic reference showing the activity is within the physical/geographical boundary of the PoA

3	Additionality	Each CPA will use Methodological Tool 19, as each CPA is a micro-scale activity and located in an LDC	The CPA meets the criteria for additionality
4	Size Limit	Each CPA will apply the microscale threshold at the unit level, i.e. no single unit, defined as a single hydro powered mini grid, will exceed 20 ktCO <sub>2</sub> e per year	Each CDM Unit realizes emission reductions equal to or less than 20,000 per CDM Unit per annum from type III technologies
5	De-Bundling	Each CPA will demonstrate that debundling does not apply to the CPA as per the Methodical Tool 19	The CPA demonstrates that debundling does not apply
6	Double Counting	Each CPA will utilize unique identifiers, such as GPS coordinates for every technology/measure under the CPA.	A description of the unique identifier along with adherence to the CME Manual
7	Start Date	Each CPA will prove that the start date of the CPA is on or after the start date of the PoA. The start date of the CPA is the date on which construction, implementation, or real action concerning the CPA, as shown through a contract detailing real action or an invoice for equipment.	The start date of the activity as shown through a purchase order, service agreement, or other type of contract
8	Crediting Period	Each CPA will have a fixed crediting period.	The type of crediting period is fixed
9	Public Funding	Each CPA will confirm that it is not receiving funding dedicated as Official Development Assistance (ODA) through a two-stage process. The first stage is a check if the CPA is receiving public funding. If the CPA is not receiving public funding a statement from the CPA Implementer stating such is provided. If the CPA is receiving public funding a statement is required from the funder affirming that the public funding is not ODA.	A statement that the activity is not receiving public funding or the public funding is not ODA

10	Methodology	Each CPA will apply the CDM baseline and monitoring methodology AMS-III.BL Version 1, and adhere to all applicability conditions and other requirements of the methodology	Application of CDM methodologies AMS-III.BL Version 1
11	Target Group	Each CPA targets households and institutions/SMEs	Target groups are households or institutions
12	Stakeholder Consultation and Environmental Analysis	The Local Stakeholder Consultation and Environmental Impact Analysis have been conducted at the PoA level. Each CPA will take into consideration the comments from the Stakeholder Consultation and abide by the environmental regulations of the host country	Consideration of the comments from Local Stakeholder Consultation, and a statement that the CPA will adhere to the environmental regulations of the host country.
13	CER Ownership	Each CPA will assure ownership of the CERs is secured by the CME	A statement by the CPA Implementer that it has yielded the rights to any CERs to the CME and that the CPA Implementer will ensure any distributors, manufacturers, or service providers cede their rights to the resulting CERs as well

## **PART V. Generic component project activity (CPA)**

### **SECTION H. Description of generic CPA**

#### **H.1. Title of generic CPA**

Mali Rural Electrification Program – Grid Extension CPA

#### **H.2. Reference number of generic CPA**

Generic CPA Type 4

#### **H.3. Purpose and general description of generic CPA**

CPA Type 4 covers the extension of the national grid with the goal of electrifying communities who prior to the project activity did not have access to the national grid. The CPA Implementer will operate the CPA under the PoA. For the CPA, the CPA Implementer and CME are the same entity. The CME/CPA Implementer will coordinate the extension of the national grid in the CPA boundary and disburse the financing and materials for the grid connections. The different Type 4 CPAs will be distinguished from one another by the region they cover. The purpose of the CPA is to provide access to electricity to households in the CPA boundary through grid connection to a national/regional grid.

The CPA applies Type III small-scale methodology AMS-III.BL Version 1. The CPA is therefore a Type III CPA. The CPA also qualifies as a Type III microscale CPA. The CPA is implemented entirely in and LDC and the size of each CDM Unit, defined as a single metered household or SME/Institution connected to the grid, is limited to emission reductions of 20,000 tCO<sub>2</sub>e or less per annum.

Consumers participating in the project activity will agree to the terms of the PoA and cede all rights to any CERs resulting from the PoA and to submit to the monitoring plan of the PoA.

The CPA Implementer, CME, and various local partners work together to disseminate a range of eligible technologies to households and institutions within the CPA boundary. Carbon credit revenue through the sale of CERs is crucial to the sustainability of the programme.

The CPA Implementer adheres to the CME management system and provides the CME with information required to include the project activity under the PoA, and perform monitoring and verification of the activity.

#### **H.4. Technologies/measures**

##### Target Group

CPAs under Type 4 target households and SMEs/institutions who prior to the activity did not have access to the national grid or regional grid.

##### Technology

CPAs under Type 4 use power lines and pre-paid electricity meters to connect households and SMEs/institutions under the project activity to the national grid. The specific CPA will provide a description of technologies/measures to be employed, including all technical specifications required by the applied methodologies.

CPA Boundary

The project boundary covers all transmission lines within the national grid and all power generation systems, as well as the end-user household that is connected as per the methodology,

CPAs under Type 4 have a geographic boundary covering a region in the republic of Mali within which grid connections will be made under the specific CPA. Type 4 CPAs will be differentiated by the region they cover.

Record Keeping System

CPAs under Type 4 utilize an electronic monitoring system to record the end-users connected to the grid, date of connection, connections, and connection type, among other things. The record keeping system to prove adherence to the management system detailed in Section B in the Part I, above.

## SECTION I. Application of selected methodologies and standardized baselines

### I.1. Reference to methodologies and standardized baselines

CPAs operating under the PoA, reference the following methodologies, tools, and guidelines:

- *AMS-III.BL Integrated methodology for electrification of communities Version 1.0*<sup>35</sup>
- *AMS-I.D Grid connected renewable electricity generation Version 18.0*<sup>36</sup>
- *AM0045 Grid connection of isolated electricity systems Version 3.0*<sup>37</sup>
- *Tool to calculate the emission factor for an electricity system Version 5.0*<sup>38</sup>
- *Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion Version 2.0*<sup>39</sup>
- *Tool 19 Demonstration of additionality of microscale project activities Version 8.0*<sup>40</sup>

### I.2. Applicability of methodologies and standardized baselines

Each Type 4 CPA under the PoA will implemented AMS-III.BL Version 1 Integrated methodology for electrification of communities.

A Type 4 CPA under the PoA will implement extensions of a grid (national, regional, or mini-grid). The CPA is limited to emission reductions of 20,000 tCO<sub>2</sub>e per annum at the CDM Unit level.

**Table 12. Justification for the Choice of Methodology for CPA Type 4**

Methodology Paragraph	Applicability Conditions	Justification by the CPA
1	The methodology describes the scope of project activities under the methodology involving the displacement of fossil fuel use such as in fossil fuel based lighting system, stand-alone diesel generators, and diesel-based mini grids.	The proposed CPA involves the displacement of fossil fuel use through connection of consumers to a national or regional

<sup>35</sup> <https://cdm.unfccc.int/methodologies/DB/XJQ7APPRHQWLO6VSC3161I5Q8MCMNQ>

<sup>36</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

<sup>37</sup> <https://cdm.unfccc.int/methodologies/DB/UH7XSIREUC5C4QL5EU963O54CSFWGV>

<sup>38</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

<sup>39</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-03-v2.pdf>

<sup>40</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-19-v8.pdf>

		grid
2	The methodology is applicable in situations where consumers that were supplied by a fossil fuel based lighting systems, stand-alone diesel generator, and diesel based mini-grids prior to the implementation of the project, are supplied with electricity from the project activity.	The proposed CPA covers consumers not connected to a national or regional grid prior to the project activity
3	The methodology is applicable in situations where consumers that were not connected to a national/regional grid, prior to project implementation are supplied with electricity generated from the project activity. It is also applicable in situation where a fraction of consumers that were supplied with electricity from a fossil fuel based individual energy system or fossil fuel based mini-grid prior to the implementation of the project, are supplied with electricity from the project activity (i.e. moving from carbon intensive mini-grid to less carbon intensive mini grid).	The proposed CPA covers consumers not connected to a national or regional grid prior to the project activity. As well as consumers that were supplied with electricity from a fossil fuel based individual energy system or fossil fuel based mini-grid prior to the implementation of the project so long as the electricity from the project activity is less carbon intensive than prior to the project scenario.
4	As per paragraph 4 of the methodology, at least 75 per cent (by number) of the end-users connected to the national, regional, or mini-grid shall be households.	The type of end-user (i.e. household or SME/Institution) will be recorded at the time of connection. The electronic database will track the percentage of households versus SMEs/Institutions. If during monitoring it is found that the percentage of households (by number) under the CPA is less than 75%, SMEs/Institutions under the CPA will be removed from monitoring the monitoring period in question until the percentage of end-users (by number) is at least 75% households. This is further described in the monitoring plan.
5	As per paragraph 5e of the methodology, the methodology is applicable to project activities associated with extension of a grid (national or regional) to supply new consumers as well as consumers currently connected to a mini-grid	All connections under a CPA Type 4 cover electrification of communities, either without access to a grid or connected to a mini-grid, through connection to a national or regional grid.
6	The methodology, project equipment shall comply with applicable international standards or	All equipment implemented under the project will abide



	comparable national, regional, or local standards/guidelines	by local or international guidelines as demonstrated in the CPA-DD
7	For project involving the installation of hydro power plants with reservoirs the requirements prescribed under AMS-I.D shall be followed	The condition is not applicable to the proposed CPA as the project activity does not involve the installation of hydro power plants.
8	Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO <sub>2</sub> equivalent annually	Small-scale limit does not apply as each independent subsystem within the CPA (CDM Unit) will not exceed 20k tCO <sub>2</sub> per annum at the CDM Unit Level

The use of AMS-III.BL Version 1 to provide renewable energy to end-users previously not connected to a national or regional grid is thereby justified.

#### Qualification as Type III Methodology

The proposed CPA qualifies as a Type III project activity, as it covers activities not included under Type I or Type II and the small-scale limit does not apply as each CPA will be below 20k tCO<sub>2</sub> per annum at the CDM Unit Level

The monitoring plan for Type 4 CPAs will be developed in detail *ex-post*, once actual installation information is available. The submission of the monitoring plan is delayed and will be submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

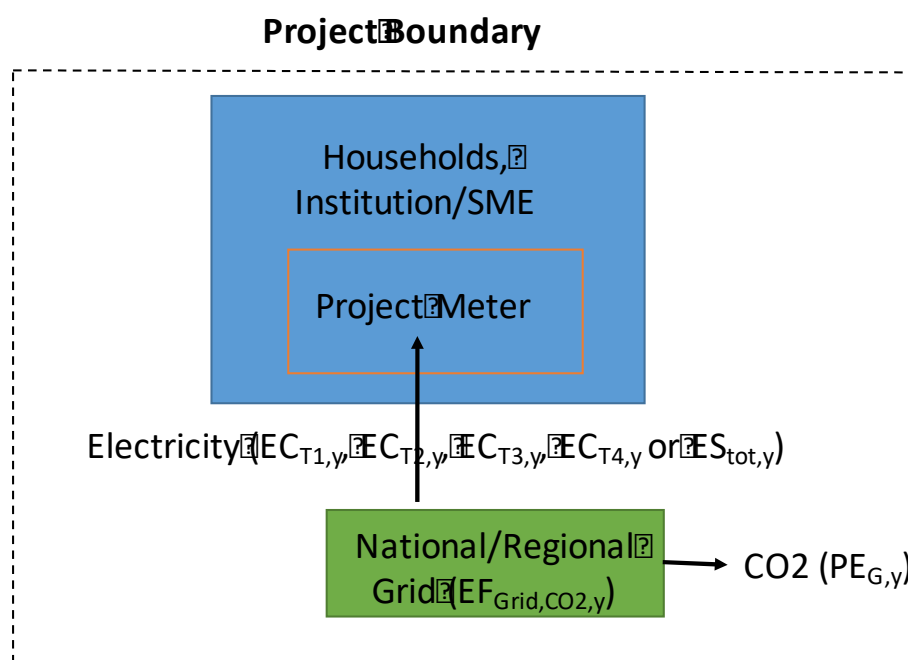
### **I.3. Application of multiple methodologies**

The CPA only applies a single methodology.

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

Source		GHG	Included?	Justification/Explanation
Baseline	Baseline Emissions (Consumption of fossil fuels)	CO <sub>2</sub>	Yes	Major source of emissions
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available
	Project Emissions (fossil fuels in the fuel mix of the national or regional grid)	CO <sub>2</sub>	Yes	Major source of emissions
		CH <sub>4</sub>	No	Minor source of emissions and limited data available
		N <sub>2</sub> O	No	Minor source of emissions and limited data available

The diagram below delineates the CPA boundary, and includes all equipment, systems, and flows of mass and energy.



**Figure 5. Diagram for CPA Type 4**

### I.5. Establishment and description of baseline scenario

Under the methodology, as per paragraph 20, the baseline scenario is determined by the type of consumer. The proposed CPA covers Type I, Type II, Type III, and Type IV consumers.

Type I consumers represent a baseline scenario of a combination of fuel based lighting and stand-alone fossil fuel generators. Type II and Type IV consumers represent a baseline of stand-alone fossil fuel generators, as per paragraph 22 of the methodology. For Type III consumers the baseline is the fossil fuel powered mini-grid.

The baseline technology as described in section T.3 above is a stand-alone fossil fuel generators, fossil fuel based lighting systems, and fossil fuel powered mini-grids.

As such, the following parameters describe the baseline scenario under the proposed CPA.

Under Type 4 CPAs, small-scale methodology AMS-III.BL Version 1 covers the connection of consumers to a national/regional grid who prior to the project activity were not connected to a national/regional grid.

According to AMS-III.BL Version 1, the baseline scenario is the use of fossil fuels, such as in fuel-based lighting systems and stand-alone generators.

**Table 13. Baseline Parameters for CPA Type 4**

Baseline Parameter	Description	Value	Source
$EF_{CO2,T2}$	Emission Factor for Type II consumers	1.0	AMS-III.BL Version 1

EF <sub>CO2,T1</sub>	Emission Factor for Type I consumers	6.8, 1.3, 1.0	AMS-III.BL Version 1
EF <sub>CO2,T3</sub>	Emission Factor for Type III consumers	As per table 4 of the methodology (0.9 as selected from table 4 of the methodology for sample calculation)	AMS-III.BL Version 1
EF <sub>CO2,T4</sub>	Emission Factor for Type IV consumers	1.0	AMS-III.BL Version 1
TL <sub>grid</sub>	Transmission and distribution losses where the project activity is grid extension	0.10	AMS-III.BL Version 1
TL <sub>p</sub>	Local distribution losses in the project are	0.10	AMS-III.BL Version 1

In real case CPAs of Type 4, the baseline parameter EF<sub>CO2,T3</sub> will be applied as per Table 4 of the methodology depending on the type of mini-grid available to end-users in the baseline scenario. For Type III consumers is assumed that the baseline technology is a mini grid with 24-hour service powered by a diesel generator with a capacity greater than or equal to 135 kW but less than 200 kW. For the sample calculation, the default emission factor for this baseline technology is listed in Table 4 of the methodology as 0.9 tCO<sub>2</sub> per MWh. The mini-grid characteristics (Load Factor, Capacity) will be determined for each mini-grid covered by the project activity during monitoring, as per the monitoring plan of the real case CPA.

As the emission reductions are determined based on the consumption of power in the project scenario, multiplied by default baseline emission factors listed above, suppressed demand is already reflected in the baseline emissions calculation and need not be considered further.

In the CPA boundary, there are neither national and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels, nor national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies, implemented before the adoption of the Kyoto Protocol (December 1997) or since the adoption of the CDM M&P (November 2001).

## I.6. Estimation of emission reductions

### I.6.1. Explanation of methodological choices

Determination of baseline emissions:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T3,y} + BE_{T4,y} \quad \text{Equation (37)}$$

$BE_{T1,y}$  Baseline emissions for Type I consumers in year y (tCO<sub>2</sub>)

$BE_{T2,y}$  Baseline emissions for Type II consumers in year y (tCO<sub>2</sub>)

$BE_{T3,y}$  Baseline emission for Type III consumers in year y (tCO<sub>2</sub>)

$BE_{T4,y}$  Baseline emissions for Type IV consumers in year y (tCO<sub>2</sub>)

Determination of project emissions:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (38)}$$

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

Project emissions from the regional or national grid is calculated as follows:

$$PE_{G,y} = \frac{ES_{tot,y} \times EF_{grid,CO_2,y}}{(1 - TL_{grid})} \quad \text{Equation (39)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EF_{grid,CO_2,y}$  Emission factor of the project electricity system in year y (tCO<sub>2</sub>/MWh)

$TL_{grid}$  Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

$$ES_{tot,y} = \frac{\sum_{x=1}^{Ny} EC_{T1,x,y} + \sum_{z=1}^{My} EC_{T2,w,y} + \sum_{w=1}^{Py} EC_{T3,w,y} + \sum_{i=1}^{Qy} EC_{T4,i,y}}{(1 - TL_p)} \quad \text{Equation (40)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EC_{T1,x,y}$  Metered annual electricity consumption of Type I consumer x in year y (MWh)

$EC_{T2,z,y}$  Metered annual electricity consumption of Type II consumer z in year y (MWh)

$EC_{T3,w,y}$  Metered annual electricity consumption of Type III consumer w in year y (MWh)

$EC_{T4,i,y}$  Metered annual electricity consumption of Type IV consumer i in year y (MWh)

$TL_p$  Local distribution losses in the project area (%), with 10 per cent as a default value

A generic CPA determines leakage as per AM0045 Grid connection of isolated electricity systems Version 3:

$$LE_y = A_{def} * L_c \quad \text{Equation (41)}$$

Where:

$LE_y$  Leakage emissions in year y (tCO<sub>2</sub>e/y)

$A_{def}$  Area of land deforested in hectares

$L_c$  Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO<sub>2</sub> per hectare

Emission reductions (ER<sub>y</sub>) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (42)}$$

Where:

$ER_y$  Emission reductions in year y (tCO<sub>2</sub>e/y)

$BE_y$  Baseline emission in year y (tCO<sub>2</sub>e/y)

$PE_y$  Project emissions in year  $y$  (tCO<sub>2</sub>e/y)

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e/y)

### I.6.2. Data and parameters fixed ex ante

<b>Data / Parameter:</b>	EF <sub>CO2,T1</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type I consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	6.8, 1.3, 1.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T2</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type II consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	1.0
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T3</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type III consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	As per table 4 of the methodology (0.9 as selected from table 4 of the methodology for sample calculation)
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	EF <sub>CO2,T4</sub>
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission Factor for Type IV consumers
Source of data:	AMS-III.BL Version 1
Value(s) applied:	1.0

Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of baseline emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>grid</sub>
Data unit:	-
Description:	Transmission and distribution losses in the project activity electricity system supplying the project activity (%)
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.1
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of project emissions
Additional comment:	

<b>Data / Parameter:</b>	TL <sub>p</sub>
Data unit:	-
Description:	Transmission and distribution losses within the project area
Source of data:	AMS-III.BL Version 1
Value(s) applied:	0.1
Choice of data or Measurement methods and procedures:	Default value from methodology
Purpose of data	Determination of project emissions
Additional comment:	

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

Emission reductions for technologies/measures under AMS-III.BL Version 1 for a Type 4 CPA are calculated shown below. The equations and calculations for baseline emissions, project emissions, and leakage below will be applied to each Type 4 CPA under the PoA for each year of the crediting period. The sample calculation applies the equations to be used with sample values.

Baseline emission values are determined for each consumer type as per the baseline for each consumer in the methodology. The table in section I.5 of the Type 4 generic CPA, above shows the baseline emission factors from the methodology for the different consumer types.

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (43)}$$

Where:

$ER_y$  Emission reductions in year  $y$  (tCO<sub>2</sub>e/y)

$BE_y$  Baseline emission in year  $y$  (tCO<sub>2</sub>e/y)

$PE_y$  Project emissions in year  $y$  (tCO<sub>2</sub>e/y)

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e/y)

Project emissions under CPA Type 4 are calculated as follows:

$$PE_y = PE_{IS,y} + PE_{G,y} \quad \text{Equation (44)}$$

Where:

$PE_{IS,y}$  Project emissions from new or rehabilitated individual renewable or hybrid energy systems in year  $y$  (tCO<sub>2</sub>)

$PE_{G,y}$  Project emission from renewable and hybrid mini-grids and grid extension in year  $y$  (tCO<sub>2</sub>)

Under Type 4 CPAs,  $PE_{IS,y}$  is zero as no new or rehabilitated individual renewable or hybrid energy systems will be installed.

$$PE_{G,y} = \frac{(ES_{tot,y} \times EF_{grid,CO2,y})}{(1 - TL_{grid})}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EF_{grid,CO2,y}$  Emission factor of the project electricity system in year  $y$  (tCO<sub>2</sub>/MWh)

$TL_{grid}$  Transmission and distribution losses in the project activity electricity system supplying the project activity (%)

Total electricity supplied to all new and existing consumers is calculated as:

$$ES_{tot,y} = \frac{\sum_{x=1}^{Ny} EC_{T1,x,y} + \sum_{z=1}^{My} EC_{T2,z,y} + \sum_{w=1}^{Py} EC_{T3,w,y} + \sum_{i=1}^{Qy} EC_{T4,i,y}}{(1 - TL_p)} \quad \text{Equation (45)}$$

Where:

$ES_{tot,y}$  Total electricity supplied to all new and existing consumers (MWh)

$EC_{T1,x,y}$  Metered annual electricity consumption of Type I consumer  $x$  in year  $y$  (MWh)

$EC_{T2,z,y}$  Metered annual electricity consumption of Type II consumer  $z$  in year  $y$  (MWh)

$EC_{T3,w,y}$  Metered annual electricity consumption of Type III consumer  $w$  in year  $y$  (MWh)

$EC_{T4,i,y}$  Metered annual electricity consumption of Type IV consumer  $i$  in year  $y$  (MWh)

$TL_p$  Local distribution losses in the project area (%), with 10 per cent as a default value

Under a generic CPA leakage is calculated as follows:

$$LE_y = A_{def} * L_c \quad \text{Equation (46)}$$

Where:

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e/y)

$A_{def}$	Area of land deforested in hectares
$L_C$	Carbon stock per unit area (above ground, below ground, soil carbon, litter and dead biomass), in tonnes of CO <sub>2</sub> per hectare

For no generic CPA will energy generating equipment be transferred from another activity.

Under a generic CPA, baseline emissions are calculated as follows:

$$BE_y = BE_{T1,y} + BE_{T2,y} + BE_{T3,y} + BE_{T4,y} \quad \text{Equation (47)}$$

Where:

$BE_{T1,y}$	Baseline emissions for Type I consumers in year y (tCO <sub>2</sub> )
$BE_{T2,y}$	Baseline emissions for Type II consumers in year y (tCO <sub>2</sub> )
$BE_{T3,y}$	Baseline emission for Type III consumers in year y (tCO <sub>2</sub> )
$BE_{T4,y}$	Baseline emissions for Type IV consumers in year y (tCO <sub>2</sub> )

For all Type 4 CPAs, all end-users will be metered to measure the electricity consumption ex-post.

Baseline emissions for Type I consumers are calculated as follows:

$$BE_{T1,y} = \sum_{x=1}^N (EC_{T1,x,y} \times EF_{CO2,T1}) \quad \text{Equation (48)}$$

Where:

$EC_{T1,x,y}$	Annual electricity consumption of Type I consumer x in year y (MWh)
$EF_{CO2,T1}$	Emission factor for Type I consumers: <ul style="list-style-type: none"> <li>○ If the electricity consumed during year y is equal to or less than 0.055MWh/y, then use a default value of 6.8</li> <li>○ If the electricity consumed during year y is less than or equal to 0.25 MWh/y but greater than 0.055 MWh/y then for the portion up to and including 0.055 MWh/y, use a default value of 6.8 and for the portion greater than 0.055 MWh/y, use a default value of 1.3</li> <li>○ If the electricity consumed during year y is greater than 0.25 MWh/y but less than 0.500 MWh/y then for the portion up to and including 0.055 MWh/y, use a default value of 6.8, for the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3, and for the portion greater than 0.25 MWh/y use a default value of 1.0.</li> <li>○ If the electricity consumed is greater than 0.500 MWh/y then use a default value of 1.0 for the entire portion</li> </ul>
$N_y$	Number of Type I consumers in year y
x	Type I consumer (x = 1, 2, 3, ...)

Baseline emissions for Type II consumers are calculated as follows:

$$BE_{T2,y} = \sum_{z=1}^M (EC_{T2,z,y} \times EF_{CO2,T2}) \quad \text{Equation (49)}$$



Where:

$EC_{T2,z,y}$	Metered annual electricity consumption of Type II consumer $z$ in year $y$ (MWh)
$EF_{CO2,T2}$	Baseline emission factor for Type II consumers (1.0 tCO <sub>2</sub> /MWh)
$M_y$	Number of Type II consumers in year $y$
$z$	Type I consumer ( $x = 1, 2, 3, \dots$ )

Baseline emissions for Type III consumers are calculated as follows:

$$BE_{T3,y} = \sum_{w=1}^P (EC_{T3,w,y} \times EF_{CO2,T3}) \quad \text{Equation (50)}$$

Where:

$EC_{T3,w,y}$	Metered annual electricity consumption of Type III consumer $w$ in year $y$ (MWh)
$EF_{CO2,T3}$	Baseline emissions factor for Type III consumers
$P_y$	Number of Type III consumers in year $y$
$w$	Type III consumer ( $x = 1, 2, 3, \dots$ )

Baseline emissions for Type IV consumers are calculated as follows:

$$BE_{T4,y} = \sum_{i=1}^Q (EC_{T4,i,y} \times EF_{CO2,T4}) \quad \text{Equation (51)}$$

Where:

$EC_{T4,q,y}$	Metered annual electricity consumption of Type IV consumer $i$ in year $y$ (MWh)
$EF_{CO2,T4}$	Baseline emissions factor for Type IV consumers (1.0 tCO <sub>2</sub> /MWh)
$Q_y$	Number of Type IV consumers in year $y$
$i$	Type IV consumer ( $x = 1, 2, 3, \dots$ )

### Sample Calculation

For the sample calculation for baseline emissions, it is assumed that the summation of electricity consumption by Type I consumers is as follows:

- Total consumption under 55 kWh is 2,000 kWh
- Total consumption between 55 kWh and 250 kWh is 3,000 kWh
- Total consumption between 250 kWh and 500 kWh is 4,000 kWh

- Total consumption above 500 kWh is 3,000 kWh

The emission factor for Type I consumers is tiered as shown above. For Type III consumers, it is anticipated that the default baseline emission factor for Type III consumers is 0.9 tCO<sub>2</sub>/MWh, reflecting common use of a diesel generator in the baseline with a load factor of 25% and a capacity greater than or equal to 135 kW but less than 200 kW, as per table 4 of the methodology. The characteristics of the baseline generator for each Type III consumer under the project activity will be determined during monitoring and the relevant value from table 4 of the methodology, applied.

Baseline emissions for Type I consumers are calculated as follows:

$$BE_{T1,y} = 2 \text{ MWh} * 6.8 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.3 \text{ tCO}_2/\text{MWh} + 4 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} + 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 24.5 \text{ tCO}_2$$

For Type II consumers the total consumption is assumed to be 3,000 kWh.

$$BE_{T2,y} = 3 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 3 \text{ tCO}_2$$

For Type III consumers the total consumption is assumed to be 3,000 kWh.

$$BE_{T3,y} = 3 \text{ MWh} * 0.9 \text{ tCO}_2/\text{MWh} = 2.7 \text{ tCO}_2$$

For Type IV consumers the total consumption is assumed to be 4,000 kWh.

$$BE_{T4,y} = 4 \text{ MWh} * 1.0 \text{ tCO}_2/\text{MWh} = 4 \text{ tCO}_2$$

Total baseline emissions are then:

$$BE_y = (24.5 + 3.0 + 2.7 + 4.0) \text{ tCO}_2 = 34.2 \text{ tCO}_2$$

For the purpose of the sample calculation leakage is assumed to be less than 5% of total project emissions and therefore negligible. In addition, no energy equipment is transferred from another activity.

Project emissions are calculated as follows:

$$PE_{G,y} = (22 \text{ MWh} * 0.5 \text{ tCO}_2/\text{MWh}) / (1 - 0.1) = 12.2 \text{ tCO}_2$$

The emission factor of the grid is assumed to be 0.5 tCO<sub>2</sub>/MWh. For an actual CPA, the grid emission factor will be determined using Methodological Tool 7.

$$ER_y = 34.2 \text{ tCO}_2 - 12.2 \text{ tCO}_2 - 0 \text{ tCO}_2 = 22.0 \text{ tCO}_2$$

## I.7. Monitoring plan

### I.7.1. Data and parameters to be monitored

For the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.<sup>41</sup>

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<sup>41</sup> The decision to delay the development of the monitoring plan occurred during in person meeting in Bamako, Mali on 16/05/2016.

Therefore, this section is intentionally blank.

<b>Data / Parameter:</b>	
Data unit:	
Description:	
Source of data:	
Value(s) applied	
Measurement methods and procedures:	
Monitoring frequency:	
QA/QC procedures:	
Purpose of data	
Additional comment:	

### I.7.2. Sampling plan

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

### I.7.3. Other elements of monitoring plan

As above, for the proposed PoA, the submission of the monitoring plan delayed and submitted either at any time prior to the submission of request for issuance for the first monitoring period, or together with the request for issuance for the first monitoring period.

## SECTION J. Crediting period type and duration

The CPA has a fixed crediting period.

The length of the crediting period is 10 years and 0 months.

## SECTION K. Eligibility criteria for inclusion of CPAs

**Table 14. Eligibility Criteria for CPA Type 4**

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Technology	Each CPA covers extension of the national grid. Each connection utilizes a pre-paid meter.	Description of the technologies including expected lifetime, capacity (if applicable), load (if applicable) and any manufacturer certifications required by the methodologies are attached

2	Location	Each CPA will be located within the physical/geographical boundary of the PoA.	Geographic reference showing the activity is within the physical/geographical boundary of the PoA
3	Additionality	Each CPA will use Methodological Tool 19, as each CPA is a micro-scale activity and located in and LDC	The CPA meets the criteria for additionality
4	Size Limit	Each CPA will apply the microscale threshold at the unit level, i.e. no single unit, defined as a single metered connection, will exceed 20 ktCO <sub>2</sub> e per year	The activity realizes emission reductions equal to or less than 20,000 per CDM Unit per annum from type III technologies
5	De-Bundling	Each CPA will demonstrate that debundling does not apply to the CPA as per the Methodical Tool 19	Each CPA demonstrates that debundling does not apply
6	Double Counting	Each CPA will utilize unique identifiers, such as GPS coordinates for every technology/measure under the CPA.	A description of the unique identifier along with adherence to the CME Manual
7	Start Date	Each CPA will prove that the start date of the CPA is on or after the start date of the PoA. The start date of the CPA is the date on which construction, implementation, or real action concerning the CPA, as shown through a contract detailing real action or an invoice for equipment.	The start date of the activity as shown through a purchase order, service agreement, or other type of contract
8	Crediting Period	Each CPA will have a fixed crediting period.	The type of crediting period is fixed
9	Public Funding	Each CPA will confirm that it is not receiving funding dedicated as Official Development Assistance (ODA) through a two-stage process. The first stage is a check if the CPA is receiving public funding. If the CPA is not receiving public funding a statement from the CPA Implementer stating such is provided. If the CPA is receiving public funding a statement is required from the funder affirming that the public funding is not ODA.	A statement that the activity is not receiving public funding or the public funding is not ODA

10	Methodology	Each CPA will apply the CDM baseline and monitoring methodology AMS-III.BL Version 1, and adhere to all applicability conditions and other requirements of the methodology	Application of CDM methodologies AMS-III.BL Version 1
11	Target Group	Each CPA targets households and institutions/SMEs not connected to a national/regional grid prior to the activity, or connected to a fossil fuel based mini-grid prior to the activity, who are provided with less carbon-intensive electricity as a result of the project activity.	Target groups are households or institutions previously not connected to a national or regional grid who are provided with less carbon-intensive electricity as a result of the project activity
12	Stakeholder Consultation and Environmental Analysis	The Local Stakeholder Consultation and Environmental Impact Analysis have been conducted at the PoA level. Each CPA will take into consideration the comments from the Stakeholder Consultation and abide by the environmental regulations of the host country	Consideration of the comments from Local Stakeholder Consultation, and a statement that the CPA will adhere to the environmental regulations of the host country.
13	CER Ownership	Each CPA will assure ownership of the CERs is secured by the CME	A statement by the CPA Implementer that it has yielded the rights to any CERs to the CME and that the CPA Implementer will ensure any distributors, manufacturers, or service providers cede their rights to the resulting CERs as well

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

<b>Coordinating/managing entity and/or project participants</b>	<input checked="" type="checkbox"/> Coordinating/managing entity <input type="checkbox"/> Project participant
<b>Organization name</b>	Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rurale (AMADER)
<b>Country</b>	Mali
<b>Address</b>	Colline de Badalabougou, Bamako, BP E715
<b>Telephone</b>	+223 89 61 15 27
<b>Fax</b>	-
<b>E-mail</b>	cheikmagass2000@yahoo.fr
<b>Website</b>	-
<b>Contact person</b>	Cheicknè Magassouba

<b>Coordinating/managing entity and/or project participants</b>	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Project participant
<b>Organization name</b>	International Bank for Reconstruction and Development (IBRD) as trustee of the Carbon Initiative for Development (Ci-Dev)
<b>Country</b>	United States
<b>Address</b>	1818 H Street NW, DC 20433
<b>Telephone</b>	+1-202-458-4416
<b>Fax</b>	+1-202-522-7432
<b>E-mail</b>	lbrd-carbonfinance@worldbank.org
<b>Website</b>	www.carbonfinance.org
<b>Contact person</b>	Jose Andreu

## Appendix 2. Affirmation regarding public funding

The PoA has not resulted in a diversion of ODA funding. The statement on public funding has been included in the Letter of Approval from the Annex I Party, Sweden.<sup>42</sup>

## Appendix 3. Applicability of methodologies and standardized baselines

Appendix is intentionally blank.

<sup>42</sup> LoA 2017-7320.pdf

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

Appendix is intentionally blank.

## **Appendix 5. Further background information on monitoring plan**

Appendix is intentionally blank.

## **Appendix 6. Summary report of comments received from local stakeholders**

See the stakeholder report for the summary of comments received.<sup>43</sup>

## **Appendix 7. Summary of post-registration changes**

The following corrections were made to the PoA-DD:

1. Design change of the PoA-DD and Generic CPA Type 1 to cover new renewable energy and hybrid mini-grid systems in addition to hybridization of existing mini-grids. This included a change to the equations used to reflect the inclusion of consumer Types I and II, in addition to consumer Type III.
2. Correction to the section on Eligibility Criteria for the Generic CPAs was made to include a criterion on CER ownership rights.
3. Correction of Generic CPA Type 2 to state that battery-charged LED and CFL technologies included under the CPA Type will be Lighting Africa-certified and have a capacity equal to or less than 10W.

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<sup>43</sup> Mali Local Stakeholder Consultation Report.pdf

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN);</li> <li>• Make editorial improvements.</li> </ul>
08.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Improve consistency with the “CDM project standard for programmes of activities” and with the PDD and CPA-DD forms;</li> <li>• Make editorial improvement.</li> </ul>
07.0	25 May 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN) (version 01.0);</li> <li>• Incorporate the “Programme design document form for small-scale CDM programmes of activities” (CDM-SSC-PoA-DD-FORM);</li> <li>• Make editorial improvement.</li> </ul>
06.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: <ul style="list-style-type: none"> <li>• Include provisions related to choice of start date of PoA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Add exception for generic CPA where technology is under positive lists;</li> <li>• Make editorial improvement.</li> </ul>
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1;</li> <li>• Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6;</li> <li>• Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM;</li> <li>• Make editorial improvement.</li> </ul>



<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	3 December 2012	EB 70 Revision to reflect changes to the <i>Guideline: Completing the programme design document form for CDM programmes of activities</i> (EB 70, Annex 6).
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.
Decision Class: Regulatory		
Document Type: Form		
Business Function: Registration		
Keywords: programme of activities, project design document		