



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

CONTENTS

- A. General description of small-scale programme of activities (SSC-PoA)
- B. Duration of the small-scale programme of activities
- C. Environmental Analysis
- D. Stakeholder comments
- E. Application of a baseline and monitoring methodology to a typical small-scale CDM Programme Activity (SSC-CPA)

Annexes

Annex 1: Contact information on Coordinating/managing entity and participants of SSC-PoA

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

NOTE:

- (i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.
- (ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).



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

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

CarbonSoft Open Source PoA, LED Lighting Distribution: Pan Africa

Date: 01/06/2012

Version: 3

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

CarbonSoft Corporation (“CarbonSoft”) aims to develop purpose-designed, renewable energy charged, LED/CFL lamp distribution projects. These projects will specifically replace existing and predominant use of kerosene-based lighting with purpose designed LED/CFL lamps in countries situated on the African continent (the “PoA” or “Projects”).

The baseline technologies, such as simple tin kerosene lamps, are so inexpensive to produce that even with rising fuel prices being felt, they remain the cheapest option for many families. For example, the price of a “tin” lamp is \$0.20; whilst a high quality “hurricane” lantern could only cost around \$5¹. The likelihood that families would connect to a local power grid remains small given the extremely high costs for getting a connection as compared to the average gross income in Africa².

Off-grid renewable lighting solutions offer a compelling and game changing market opportunity to reduce greenhouse gas (“GHG”) emissions and improve quality of life. CarbonSoft’s partners are seeking to distribute the lowest-priced solar lamp product to low-income families. This can only be achieved through the additional financial benefits leveraged from accessing the CDM and the carbon market.

1. General operating and implementing framework of PoA

According to the recent “From Carbon to Light” report one quarter of humanity continues to obtain illumination by burning fossil fuels, which is estimated to generate 190 million tonnes of carbon dioxide (“CO₂”) per year³.

Undertaking approved activities as described in this PoA, will create the opportunity for people using kerosene for lighting to access and obtain high quality, low cost lighting solutions that meet the quality standards specified in AMS.III.AR.

Qualifying ‘Project Lamps’ consist of at least one Light Emitting Diode (“LEDs”) or Compact Fluorescent Lamps (“CFLs”) that provide high quality, long-life and consistent luminosity. The lighting source is connected to a rechargeable battery, which is in turn connected to an energy source such as a photovoltaic

¹ “Carbon to Light”

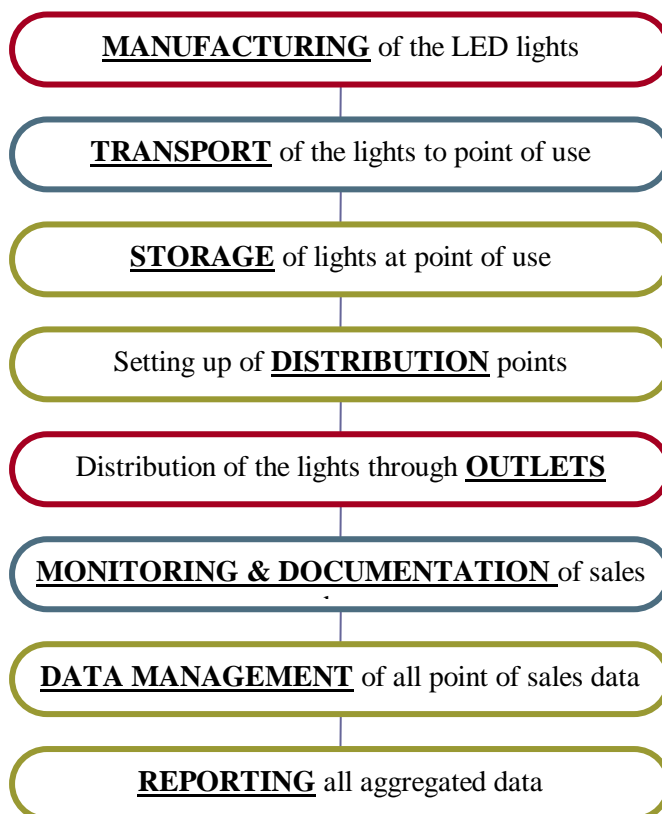
² <http://www.fias.net/advisory-services/regulatory-simplification/doing-business-reform-advisory/upload/5-Carolin-Geginat-Getting-Electricity-World-Bank.pdf>

³ <http://light.lbl.gov/pubs.html>. Accessed September 2011



(“PV”) panel. In practical terms an LED is a semiconductor diode that emits light when an electrical current is applied. LEDs are ideal for rural lighting purposes due to their efficiency, long lifetime, ruggedness and low maintenance costs associated.

Process flow for a generic CPA project:



2. Policies and measures of the stated goal of the PoA

The CME of the PoA will develop and coordinate project developers to replace kerosene-based lighting with approved Project Lamps across countries in Africa. The implementation of the PoA will have the following sustainable impacts;

- **Cost savings:** by replacing kerosene, families may have more available income to spend on their welfare priorities such as education, medicine and food
- **Energy Conservation:** by using LED/CFL lights, kerosene is saved. The batteries will be charged by renewable energy sources, such as solar power, and will hence lead to energy conservation



- **Job creation:** the supply, storage, distribution and maintenance (including battery renewal) of Project Lamps may stimulate the creation of new employment opportunities across the region of the CPA
- **Clean-energy education:** the promotion and use of LED/CFL lamps that use renewable sources of energy for charging may enable families to experience sustainable development in a tangible way that can positively affect their lives. Incorporating the management and maintenance of LED/CFL lamps utilizing clean energy in a household will provide direct education
- **Improved education environment:** The use of LED lamps has been recognized to promote improved learning conditions that in turn favour increased literacy. Whilst official data is not available for countries in the African region, one study focused on Indian homes claims that average study time of students rose from 1.47 hours to 2.71 hours per day⁴, with a positive effect on school performance
- **Improved health and safety:** human deaths and physical burns are commonly associated with the use of flame-based domestic appliances. Reduction in the use of kerosene may contribute to the prevention of such domestic accidents and will also reduce indoor air pollution

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/Coordinating/Managing Entity

The proposed PoA is a voluntary action by the private group, CarbonSoft Corporation Limited as Coordinating /Managing Entity (CME) of the PoA.

Expansion of PoA:

The Republic of Malawi is the first country in the *CarbonSoft Open Source PoA, LED Lighting Distribution: Pan Africa*. In the future, the CME intends to include all countries on the continent of Africa into the PoA.

The following are the countries that will be added to the PoA at a later stage:

Algeria, Angola, Botswana, Burkina Faso, Benin, Burundi, Cameroon, Cape Verde, Chad, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Equatorial Guinea, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, United Republic of Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe

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

Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project
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⁴ <http://light.lbl.gov/pubs/tr/lumina-tr5.pdf>



		participant (Yes/No)
Malawi (host)	Solar Solutions Ltd.	No
United Kingdom	Standard Bank Plc	No
United Kingdom	CarbonSoft Corporation Ltd	No

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

The following sections provide PoA project concept information, including, geographical description, technology type, operational and management plan, and monitoring structure.

A.4.1. Location of the programme of activities:

The geographical boundary of the PoA is all regions and provinces lying within the continent of Africa.

However, the project participants may choose to include more countries under the PoA, post registration. This is within the guidelines prescribed by the EB in Paragraph 6, Annex 26 of the EB 60 report⁵.

In case the project participants decide to further more add countries under the PoA post registration, they will make sure the following guidelines are met :

- 1) *The existing registered PoA design document (POA-DD) is revised to reflect the changes, in particular, the eligibility criteria for inclusion of CPAs;*
- 2) *A designated operation entity (DOE) confirms that the baseline established in the POA-DD is applicable to the extended programme boundary; and*
- 3) *The DNA of the new Host Party issues a letter of approval for the programme and a letter of authorization for the co-ordinating and managing entity.*

A.4.1.1. Host Party(ies):

The Republic of Malawi is the first Host Party of the PoA.

A.4.1.2. Physical/ Geographical boundary:

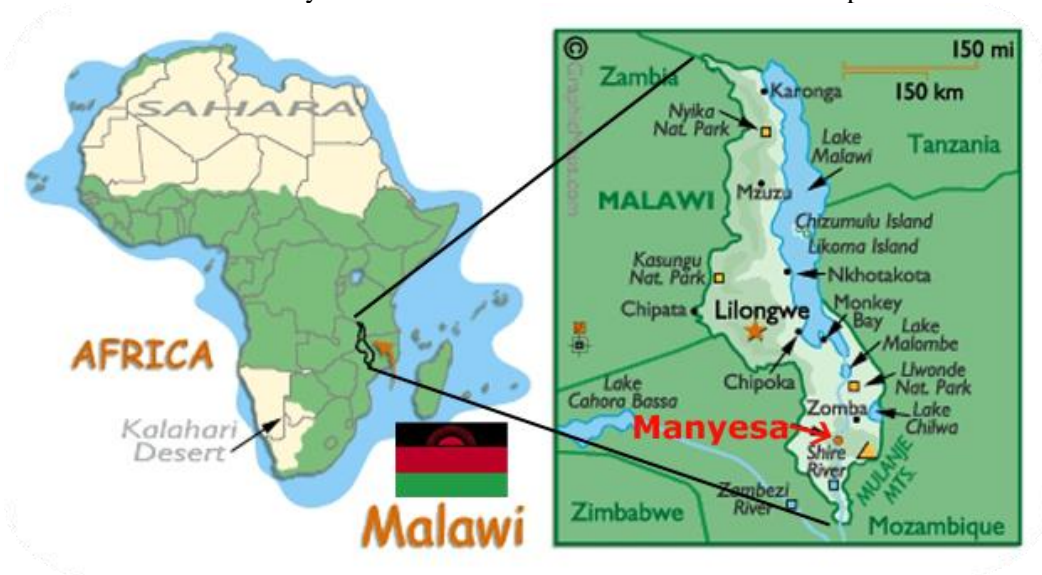
The geographical boundary of the PoA includes all regions and provinces of the countries on the continent of Africa. Each CPA will review the national environment policies related to the project activity in the country it is located.

Figure 1: Geographical boundary of the PoA

⁵ http://cdm.unfccc.int/Reference/Guidclarif/PoA/poa_guid06.pdf



Malawi is the first country where PoA is based and first CPA will be implemented



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

A typical CPA Project will represent a specific region (up to the boundary of an entire country) up to a maximum volume of 60,000 tonnes of CO₂, per year, as per the methodology.



The CPA shall demonstrate that replacing traditional kerosene lamps with Project Lamps can reduce greenhouse-gas emissions and improve the quality of life for families. These may include:

- lower household costs by reducing the need to buy kerosene;
- reduced pollutants created in the home; and
- less danger of household fires.

The benefits of replacing kerosene lamps with a renewable equivalent are tangible. US Department of State research reports for African countries show that the average per capita income in these countries is very low. For example, the per capita income in Malawi is \$280 per annum⁶, in Ethiopia it is \$365⁷ and \$465 per annum in Mozambique⁸. In Zimbabwe, the per capita income in 2010 was \$460.⁹ According to a study carried out in Malawi, the average household spent \$2.61 per month on kerosene for lighting.¹⁰

The financial benefit earned from the sale of Certified Emission Reductions (“CERs”) enables the project developer to reduce the unit price of the Project Lamps to ensure they are affordable and obtainable to low-income households in Africa.

“From Carbon to Light” estimates that 1.5 billion people lack access to electricity. Around 85% of those people are based in rural areas, mainly in Sub-Saharan Africa and South Asia.

Each CPA must adhere to the requirements as described in this PoA.

Distribution for LED lights distribution in typical CPA:

In order to ensure penetration of LED lights happens across every area in the CPA and there is no inequality of distribution and the light can reach across people from all spheres, a thorough distribution plan will be followed. The distribution plan will ensure that the Solar LED light is easily accessible to each and every household in the CPA region..

The distribution will be set up in four channels, being through the following:

1. Community and network marketing
2. By and in collaboration with government agencies, including local government and community leadership
3. By and in collaboration with charitable organisations
4. Commercial distribution, including commercial contracts with distributors and retail outlet networks

Distribution within a CPA will take place based on one or more of the above mentioned distribution channels.

⁶ <http://www.state.gov/r/pa/ei/bgn/7231.htm>

⁷ <http://www.state.gov/r/pa/ei/bgn/2859.htm>

⁸ <http://www.state.gov/r/pa/ei/bgn/7035.htm>

⁹ <http://www.indexmundi.com/facts/zimbabwe/gni-per-capita>

¹⁰ Off-grid energy services for the poor: Introducing LED lighting in the Millennium Villages Project in Malawi.



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

The Project will see the distribution of LED/CFL lamps to households across the countries involved in the African PoA. Applying the simplified modalities and procedures for small-scale CDM project activities, each CPA Project falls under the following type:

- Type III: Other Project Activities
- Sectoral Scope: 1 (Energy industries (renewable - / non-renewable sources))

Portable and ambient lighting technology

Each CPA project will potentially involve the distribution of a range of lighting products that meet the quality requirements stipulated in AMS.III.AR.

Project Lamps selected by the CPA project developer shall meet the following technology requirements as per AMS.III.AR version 2:

- LED or CFL based lighting systems shall be used for residential and non-residential applications including ambient lighting, task lighting and portable lighting
- Project Lamps shall have batteries that are charged using:
 - Charged by renewable energy systems included as part of the Project Lamp (e.g., photovoltaic systems or mechanical systems such as hand crank charger)
- At a minimum, Project Lamps, shall be certified by their manufacturer to have a rate average life of at least 5,000 hours (if the CPA goes with **Option 2**, the lamp must have an average life of 10,000 hours)
- Manufacturer certification that the Project Lamp’s battery charging efficiency, at the time of the purchase, is at least 50%
- Project Lamps shall have a minimum of a one year warranty
- Each lamp must have;
 - a luminous flux of 20 Lumens, or
 - an illuminance of 25 Lux over an area greater than or equal to 0.1 metre sq when suspended at a distance of 0.75 metres or self supported.

Development and improvements in portable and ambient lighting technology is expected to lead to a general reduction in the cost of products and increasing quality. Therefore, over the lifetime of the PoA and each CPA Project the technical features of Project Lamps are expected to improve with time. Although, solar products are common in Africa the technology has not reached all rural areas and thus the project involves the transfer of technology to the region.

Implementation of CPA projects, with the carbon finance support of the CDM, will create real, rapid and affordable technology transfer that directly and positively affects families across Africa.

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

Eligibility criteria	Qualification
Geographical boundary of each CPA	



	<p>Each CPA shall be limited to a maximum boundary equal to the size of the territory of one of the host countries included in the PoA, or lesser. The CPA will have to provide a map of the CPA boundary in the CPA-DD to demonstrate the region where the project activity will be carried out.</p>
<p>Double counting avoidance provisions</p>	<p>While inclusion of a new CPA, the ‘New CPA reviewer’ and CPA will take the following steps:</p> <ol style="list-style-type: none"> 1) Check if any similar project activity (PoA/CDM) is carried out in the CPA boundary. 2) If Yes, the CPA will need to demonstrate that how the CPA identification on the LED lights will prevent the double counting of lamps. They will also demonstrate how only LED/CFL lights with the CPA identification will be considered.
<p>Technology specifications</p>	<p>All ‘Project Lamps’ will demonstrate they meet as a minimum the following specifications:</p>
<ul style="list-style-type: none"> • The LED-based lighting systems replace portable fossil fuel based lamps in residential and non-residential applications. • The Project Lamps provide a minimum illuminance of 20 Lux as specified by the methodology AMS-III.AR version 2. • The Project Lamps shall use rechargeable batteries charged by renewable photovoltaic energy systems which are included as part of the project lamp • The manufacturer of the Project Lamps shall certify that the product has an average life of at least 5,000 hours (for Option 1) or 10,000 hours (for Option 2) • The manufacturer shall certify that the Project Lamp’s battery charging efficiency is at least 50% at the time of the customer’s purchase • Each Project Lamp shall be provided with a one year warranty which specifically covers free replacement or repair of failed lamps, batteries and where applicable solar panels • All Project Lamps manufactured carry a CPA identification, which enables them to be marked as being within the CPA Project (e.g., such as a sticker attached to the lamp). The mark will also be used to avoid double counting of emission reductions • The CPA project will comply with any current, national laws and regulations in the host country regarding the disposal of batteries • Detailed technical specification and supporting documentation regarding the Project Lamps shall be made available and specified in the individual CPA-DDs • The CPA project developer will report any sales, where more than 5 lamps have been distributed to a house hold, only the first 5 lamps shall be eligible to earn CERs. A record of all surplus sales shall be 	



kept and the total number of surplus lamps distributed shall be deducted from the final sales data prepared for verification

- In the absence of the CPA project, the burning of kerosene fuel in lanterns would be used as the primary source of light
- The Project Lamps will generate light and be used onsite and locally by the user

<i>Parameter</i>	AMS III.AR Version 2	
	2 Year	7 year
<i>Rated Average Life</i>	5,000 Hours *	10,000 hours*
<i>Project Lamp charging efficiency</i>	atleast 50% *	atleast 50%*
<i>Warranty</i>	Min 1 year	Min 1 year
<i>Minimum Illumination</i>	20 Lumens (or) 25 Lux over 0.1 metre sq when suspended from 0.75 metres or self supported **	
<i>Daily Burn Time (DBT)</i>	Min of 3.5 Hours needs to be shown **	Min of 3.5 Hours needs to be shown **
<i>Solar Fraction of battery</i>	NA	NA
<i>Battery Capacity</i>	Autonomous time should greater than equal to 5.25 Hours (150% of 3.5 Hours)**	Autonomous time should greater than equal to 5.25 Hours (150% of 3.5 Hours)**
<i>Water and Dust tightness</i>	NA	Min protection of 1P43**
<i>Solar Run Times</i>	Using a value of 5 Kwh/metre sq, the Solar Run time should be greater than or equal to 3.5 Hours **	Using a value of 5 Kwh/metre sq, the Solar Run time should be greater than or equal to 3.5 Hours**
<i>Light Output</i>	The light output over a 2,000 hour lumen maintenance test should not decline by more than 20% **	The light output over a 2,000 hour lumen maintenance test should not decline by more than 15% **

A CPA Project shall also provide detailed specifications of the Project Lamps such as:

1. Lamp wattage (in Watts) and illuminance (in lux);
2. Lamp rated lifetime (in hours);
3. The type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)



<ol style="list-style-type: none"> 4. Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere Hours); 5. Autonomous Time and Daily Burn Time 6. Solar Run Time calculation (Version 2) 7. Physical protection against environmental factors 	
<p>Evidence of the Start Date of the CPA</p>	<p>The CPA shall demonstrate the start date of the project activity.</p>
<p>Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;</p>	<p>The CPA will provide the various information listed above and the New CPA reviewer will ensure that the CPA meets the technical and other applicability conditions of the CPA, before proceeding with inclusion for the CPA.</p>
<p>The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in Section A above</p>	<p>Additionality is demonstrated at the PoA level in section A.4.3 of the PoA-DD. The CPAs will provide information at the time of inclusion to ensure that their projects do not exceed the limits of microscale projects. The demonstration of the same will be done in the Excel sheet provided to the DOE.</p>
<p>The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;</p>	<p>EIA and environmental assessment undertaken by first CPA in a host country. Information will be provided in Section C of the CPA-DD. Similarly a stakeholder will be carried out for the first CPA of the</p>
<p>Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance;</p>	<p>Section A.4.5 of the CPA-DD will provide information on the public funding of the CPA. In case there is public funding, it will be demonstrated that there is no diversion of official development assistance.</p>
<p>Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid connected/ off-grid) and distribution mechanisms (e.g. direct</p>	<p>The CPA-DD will describe in provide information in general description, the target groups of the PoA activity.</p>



<p>installation)</p>	
<p>Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys</p>	<p>Sampling is required for monitoring of those CPAs using Option 2 of the methodology wherein the lamps used will be able to generate CERs for a period of Seven years. The Monitoring plan for the same has been added in Section E.7.2 of the PoA-DD and B.6 of the Generic CPA-DD. Any CPA using the option will place a monitoring and sampling plan in accordance with the above guidelines in the CPA-DD.</p>
<p>Test to ensure that each CPA meets the micro-scale threshold criteria and remains within the thresholds through the crediting period</p>	<p>CPAs will provide information at the time of inclusion to ensure that their projects do not exceed the limits of microscale projects. The demonstration of the same will be done in the Excel sheet provided to the DOE.</p>
<p>Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories</p>	<p>According to Paragraph 10 of Annex 13 of EB 54, <i>“If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied then that CPA of PoA is exempted from performing de-bundling check (i.e., considering as not being a de-bundled component of a large-scale activity)”</i>.</p> <p>The capacity of the individual subsystem (i.e., a Project Lamp) is a light, which is significantly smaller than even 1% of the 15 MW limit specified by the small-scale methodology. Hence, the PoA is not required to demonstrate the project concept as a de-bundled component of a large-scale activity. The average capacity of each Project Lamp will be confirmed by the CarbonSoft in each individual CPA.</p>

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



Additionality for this PoA is demonstrated at the PoA level as stipulated in the “*Standard for demonstration of additionality of GHG emission reductions achieved by a programme of activities*” (Version 2, Annex 2, EB 63).

According to the standard, paragraph 7 states that “PoAs that will include one or more micro-scale projects as CPA shall include eligibility criteria derived from all the relevant requirements of the Guidelines for demonstrating additionality of micro-scale project activities”.

According to Para 2 of the guidelines (*in italics*):

Project activities up to five megawatts that employ renewable energy technology are additional if any one of the conditions below is satisfied:

- (a) *The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone of the host country identified by the government before 28 May 2010;*
- (b) *The project activity is an off-grid activity supplying energy to households/communities (less than 12 hours grid availability per 24 hrs day is also considered off-grid. for this assessment);*
- (c) *The project activity is designed for distributed energy generation (not connected to a national or regional grid) with both conditions (i) and (ii) satisfied;*
 - (i) *Each of the independent subsystems/measures in the project activity is smaller than or equal to 1500kW electrical installed capacity;*
 - (ii) *End users of the subsystems or measures are households/communities/small and medium enterprises (SMEs).*

The CarbonSoft PoA will be made of CPAs each of which is an off-grid activity that supplies energy to households and communities by replacing kerosene lamps with LED/CFL lights. Each CPA will have a maximum of 300,000 LED lights active at a given time over a year. Because typical LED lights use less than 0.5 Watts¹¹. Hence the total capacity for each CPA will be $300,000 \times 0.3 = 0.09$ MW which is much lesser than the capacity of 5 MW.

LED lamp's typically have a very low energy capacity, because of the small power consumption requirements of the LED. Typical LED lamps consume less than 0.5 Watts, which is far less than the limit of 1500 KW. The LED lamps will be distributed in households in Africa, to replace kerosene lamps, thus also meeting the requirements of (ii).

Since the project meets points (b) and (c) according to the guidelines it is additional.

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

The following sections review the monitoring approach and management plan established by the PoA.

¹¹ Based on a review of approved LED lamps by Lighting Africa



A.4.4.1. Operational and management plan:

Management Plan for CME:

Introduction:

CarbonSoft is the CME of the PoA and has developed and implemented a management system that includes the following requirements. The management plan is along the guidelines stipulated by “*Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities*” (EB 65, Annex2).

Requirement	A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies
Application	<ol style="list-style-type: none"> 1. Please refer below for details of personnel involved in the addition of new CPAs under the PoA 2. It has been ensured that responsibility is assigned to the various CarbonSoft team members based on their experience in the CDM markets.

S.No	Designation	Tasks	Experience/Management Level
1.	Liaison manager	The liaison manager will be in charge of getting in touch with those participants who wish to register CPAs under the PoA. His/Her task will be to begin communications in such interested parties and provide them with general information on the project and the conditions for the CPA to applicable under the project.	Low/Medium
2.	New CPA reviewer	Once the new CPA implementation entity is ready to join the PoA and have provided the various towards this cause, the CPA reviewer will check that the CPA covers all eligibility criteria of the PoA as described in Section A.4.2.2 of the PoA-DD. The reviewer will collaborate with the entity to ensure all criteria (such as Lamps meeting Methodology criteria) are met by means of a “CPA Inclusion form” which the new CPAs will have to fill.	High
3.	KYC Manager	The KYC (Know your Customer)	Low/Medium



		manager is in charge of gathering KYC data from the CPA counter party. These include addresses, letters, and other documents.	
4.	Implementation manager	The implementation manager will work closely with the CPA to ensure that pre-registration tasks are carried out with out any errors at the CPA end. He/She will assist in stakeholder consultations/ Host country approval/Validation activities. This will ensure the CMEs experience in CDM can be put to use by the CPA implementation entities to ensure smooth sailing of the project activity.	High
5.	Data Management Officer	The Data management officer will be responsible for collections all documents throughout the project activity. These will include data on Project lamps sold, CPA-DDs and other supporting documents that are required to be maintained by the CME.	Medium/High

Requirement	Records of arrangements for training and capacity development for personnel
Application	The CME will ensure that annual training and capacity development workshops are held for the personnel. Also any new personnel hired will undergo training and orientation workshop. Record of such will be made available to DOE on request.

Requirement	Procedures for technical review of inclusion of CPAs;
Application	Technical review for inclusion of new CPAs will be carried out by the ‘New CPA reviewer’. The tasks for above will include those mentioned in Section A.4.2.2 of the PoA-DD and which are based on the latest guidelines of the “Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities” (Annex 3, EB 65).



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Requirement	A procedure 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)
Application	<p>While inclusion of a new CPA, the ‘New CPA reviewer’ and CPA will take the following steps:</p> <ul style="list-style-type: none"> 3) Check if any similar project activity (PoA/CDM) is carried out in the CPA boundary. 4) If Yes, the CPA will need to demonstrate that how the CPA identification on the Project Lamps will prevent the double counting of lamps. They will also demonstrate how only lights with the numbers will be considered. <p>According to Paragraph 10, of Annex 13 of EB 54, “<i>If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity</i>”.</p> <p>Since the independent subsystem in this case is the light and its capacity is much lesser than 1% of 15 MW as specified by the small-scale methodology, this CPA of this PoA need not perform de-bundling check.</p>

Requirement	Records and documentation control process for each CPA under the PoA;
Application	<p>Records and documentation control will be managed by the office in charge by the ‘Data Management Officer’. The CME officer will be in charge of collecting quarterly data from the CPAs. A standard reporting document will have to be filled in by the CPAs and sent along with supporting documents by the 10th of every quarter of the crediting period. This will ensure timely collection of data at CME end and will help in the preparation of monitoring reports at the end of the crediting period.</p>

Requirement	Measures for continuous improvements of the PoA management system
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Application	<p>An annual meeting will be held very year during which all CME team members will be present. The following will be the agenda of the meeting:</p> <ol style="list-style-type: none">1) Re-cap of previous year and major developments2) Discussion of goals and whether they have been met or not3) If not, various reasons that can be attributed to the above4) Comments will be sought from each CME member and discussed.5) CPA owners will be asked to provide comments via mail and those will be considered.6) Goals for the coming year <p>The annual meeting will ensure that continuous improvements are made to the PoA management plan and to ensure proper implementation of the PoA</p>
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A.4.4.2. Monitoring plan:

The monitoring plan will be designed and demonstrated by the Implementation Entities for each individual CPA, and will include such information required, depending on which of the following options they choose:

Option 1: *Project Lamps are assumed to operate for two years after project lamp distribution to end-users. Therefore, emission reductions can only be claimed for two years;*

Option 2: *Project Lamps are assumed to operate for seven years after project lamp distribution to end-users, and thus emission reductions can be claimed for up to seven years per project lamp.*

For CPAs going with Option 1 of the methodology the Project Activity will record the following data:

1. *Number of lamps distributed to end users under the project activity, identified by the type of project lamps (lamp wattage, battery type, charging method, the date of supply).*

The Sales Record (SR) database has been established and shall contain the following information:

- Number of Project Lamps sold since the project began
- Date of sale of the Project Lamps
- Brand of Lamps
- Lamp Wattage
- Battery Type
- Charging method

For CPAs that choose Option 2 of the methodology the Project Activity will record the following data:

1. *Number of lamps distributed to end users under the project activity, identified by the type of project lamps (lamp wattage, battery type, charging method, the date of supply).*
2. *Number of lamps in use and operational within the CPA boundary*



In addition to maintaining sales records as mentioned above, since the Project Proponents are going with **Option 2** (the lamps will generate CERs for a period of 7 years), monitoring surveys will be conducted at the CPA level to determine the percentage of Project Lamps distributed to end users that are operating and in service during the third year of the crediting period.

The data will be gathered by the CPA project proponents (implementing agencies) and will be provided to the Coordinating/Managing Entity, where it will be aggregated. Data will be collected and made available to DOEs for all sales of Project Lamps. Data collected will be attributed to a single CPA. Such detailed data can be verified, because all units will be identified to their CPA by their identification number. Identification numbers will be allocated to Project Lamps based on their location of sale (i.e., within a specific CPA). Because data will be fully transparent, data sampling will be at the discretion of the DOE.

A detailed description of all parameters has been provided in Section E.7.1 and E.7.2. The Coordinating/Managing Entity will store all data in an electronic database. Primary data will be stored by the implementing entities.

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

The PoA does not receive public funding.

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

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

Date the PoA is web-hosted by the UNFCCC: 15/12/2011

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

21 Years

SECTION C. Environmental Analysis

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

- 1. Environmental Analysis is done at PoA level
- 2. Environmental Analysis is done at SSC-CPA level

Environment Analysis is done at CPA Level because the environmental impact will be different for each CPA. This is because the PoA covers multiple countries in Africa and the CPAs will be in separate countries.

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



An environmental analysis will be conducted only in the first CPA project of each host country. This is because each LED lighting project is not site specific.

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

Environmental impact assessments and pertinent laws and regulations shall be addressed at the CPA Project level.

SECTION D. Stakeholders' comments

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

1. Local stakeholder consultation is done at PoA level
2. Local stakeholder consultation is done at SSC-CPA level

The Local Stakeholder Consultations will be held at a CPA level, taking into consideration the differences of circumstances and opinions of each and every community in which each CPA is located. The goal of hosting local stakeholder consultations is to ensure that customers and affected persons will be able to share their opinions of the project and be provided with essential feedback on the CPAs proposed activities.

Stakeholder consultation will be carried out once for each host country where the CPAs are located. There is no need to carry out additional stakeholder consultations for each subsequent CPA in a host country since the project is not site specific.

CPA project developers will take care to ensure comments from all relevant stakeholders are invited and actions are carried out on the comments received.

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

Not applicable, conducted at the CPA level.

D.3. Summary of the comments received:

Not Applicable, conducted at the CPA level.

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

Not Applicable, conducted at the CPA level.

SECTION E. Application of a baseline and monitoring methodology

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



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

The methodology AMS.III.AR *“Substituting fossil fuel based lighting with LED lighting systems”* (version 2) is chosen and applicable to all CPAs.

AMS.III.AR offers project proponents two options for generating emission reductions based upon the LED Lamp’s ‘Effective Useful Life’. Each CPA will choose one of the following options to claim Certified Emissions Reductions:

Option 1: Project Lamps are assumed to operate for two years after project lamp distribution to end-users. Therefore, emission reductions can only be claimed for two years

Option 2: Project Lamps are assumed to operate for seven years after project lamp distribution to end-users, and thus emission reductions can be claimed for up to seven years per Project Lamp.

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

AMS.III.AR requirement	SSC Qualification / Justification
<i>Replace portable fossil fuel based lamps with LED/CFL based lighting systems in residential and non-residential applications</i>	As demonstrated in “Carbon to Light” the use of portable, cheap kerosene lamps is prevalent across populations across Africa. The project developer will replace consumers kerosene lamps with Project Lamps in accordance with AMS.III.AR version 2. Furthermore, the CPA will suitably demonstrate in the CPA-DD that fossil fuel lamps are a common feature in the country where the CPA is located. It will be demonstrated through publicly available data and literature review that fossil fuel is used predominantly in the region for lighting and thus distribution of Solar LEDs/CFLs will lead to reduction on consumption of Fossil Fuels.
<i>The Project Lamps shall use rechargeable batteries charged by one of the following:</i> i) <i>renewable energy systems</i> ii) <i>stand alone distributed generation systems</i> iii) <i>grid connected to the regional or national grid</i>	The PoA involves the distribution of Solar LED/CFL lights to replace kerosene lamps in Africa. Since the Project Lamp is charged from a renewable source of energy, it meets the criteria that the lamp is charged by “renewable energy systems”.
<i>The manufacture of the Project Lamps shall certify the products has an average rated life of at least</i>	All Project Lamps shall have suitable manufacturer certification that the units have an average life more



<i>5,000 hours(option 1) or 10,000 hours (option2)</i>	than the minimum average life specified by the methodology
<i>The manufacture shall certify that the LED/CFL lamps' battery charging efficiency is at least 50% at the time of the customer's purchase</i>	Manufacturer certification shall provide a battery charging efficiency of at least 50% at the time of purchase
<i>Each Project Lamp shall be provided with a one year warranty which specifically covers free replacement or repair of failed lamps, batteries and where applicable solar panels</i>	All Project Lamps shall be sold with a one year warranty for full repair or full replacement
<i>All Project lamps carry identification which enables them to be marked as being within the CPA Project and avoid double counting</i>	All Project Lamps shall have an identification so that it is marked as being within the CPA Project
<i>The disposal of batteries shall be in compliance with the regulations of the host country</i>	The CPA Project shall demonstrate and ensure compliance with prevailing regulations pertaining to the use and disposal of batteries
<i>Detailed technical specification and supporting documentation of the Project Lamps are made available and in the PDD</i>	The CPA shall provide clear information about the technical specification of the Project Lamps. Supporting documentation shall be provided to the DOE on request
<i>No more than five Project Lamps per household or business location shall be recognized for generating emission reductions within the CPA Project</i>	A maximum of five Project Lamps per household or business location shall be recognized as Project Lamps within the CPA Project. This will be determined by the CPA project developer's records. The CPA project developer will report any sales, where more than 5 lamps have been distributed to a house hold, only the first 5 lamps shall be eligible to earn CERs. A record of all surplus sales shall be kept and the total number of surplus lamps distributed shall be deducted from the final sales data prepared for verification
<i>In the absence of the CPA Project, the burning of kerosene fuel in lanterns would be used as the primary source of light</i>	As demonstrated in "Carbon to Light" the use of portable, cheap kerosene lamps is prevalent across populations across Africa. CarbonSoft will replace consumers kerosene lamps with project lamps in accordance with AMS.III.AR version 2
<i>The project lamps will generate electricity and be used onsite and locally by the user</i>	The Project Lamps will generate electricity that shall be used onsite and locally by the user
<i>Each CPA project shall only generate emissions reductions less than or equal to 60,000 tonnes of CO2 equivalent annually.</i>	Emission reductions will be capped at 60,000 tonnes of CO2 equivalent annually.



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

	Source	Gas	Included?	Justification / Explanation
<i>Baseline Activity</i>	GHG emissions generated from the combustion of kerosene fossil fuel	CO ₂	Included	Main emission source
<i>Project Activity</i>	GHG emissions from emissions due to charging of batteries (if non renewable source of energy is used)	CO ₂	No	Since the CarbonSoft deal exclusively with replacing kerosene lamps with Project Lights charged with renewable (Solar) or mechanical energy, there will be no project emissions.

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

According to methodology AMS.III.AR “Substituting fossil fuel based lighting with LED/CFL lighting systems” (version 2), there are default baseline values that may be applied to the CPA Project unless alternative values or parameters can be determined (using adequate research/monitoring and documentation) and provided by the project proponent. Suitable supporting documents include strategic surveys and research conducted by national or local organisations, international organisations, non-governmental organisations or reliable and comprehensive data collected by the project proponent.

In case the CPA project proponents have access to studies, reports or surveys as mentioned above with regard to kerosene consumption in households, that value will be used as opposed to the default value suggested by the methodology.

Pre-existing fuel-based technology

The pre-existing technology is the prevalent use of kerosene lamps, which consume significant amounts of fuel and cost a major portion of a family’s monthly income. With reference to the default values presented in AMS.III.AR the following values are applied accordingly:

- **Utilization (hours/day):** Whilst presently there is limited data on hours-per-day utilization of fuel-based lighting a fixed value of 3.5 hours per day is assumed
- **Utilization (days/year):** a default value of 365 days is assumed and 366 in each leap year.
- **Fuel emissions factor (kilograms CO₂ /litre):** we have selected a conservative value of 2.4 kg CO₂ per litre of kerosene
- **Leakage factor:** 1.0
- **Number of fuel-based lamps replaced per project lamp:** 1.0



- **Leakage factor (persistence in use of fuel-based light source)**
- **Number of fuel-based lamps replaced per LED:** whilst well-designed LED lamps may be able to replace multiple fuel-based lamps, we assume a conservative default assumption of 1:1
- The determination of the **Fuel use rate** will take place at the CPA level based on surveys or reports applicable to the CPA region. In the absence of any such report, the default value of 0.025 Litres per hour will be used for that CPA.

Ambient and portable LED/CFL lighting replacement technology

In order to demonstrate that the CPA Project meets the “additionality” and AMS.III.AR requirements the following assumptions have been taken:

- **Service life (years):** all electric lighting products experience a reduction in light output over time, a process called “lumen depreciation.” If the project developer chooses **Option 2**, they will demonstrate that the luminous flux does not reduce more than 15% over a period of 2,000 hour lumen maintenance test.
- **Net-to-Gross factor:** this value is assumed to be 1 (100%)
- **Power conversion losses (for grid charging):** if Project Lamps are charged through Renewable energy sources, no power conversion losses are taken. If they are charged through the grid, national standards for power conversion losses will be assumed.
- **Replaceable battery:** The battery compartment of the units can be simply opened by the user enabling them to be replaced. Thereafter, the organisation selling the LED lights at the CPA level will also sell replacement batteries at suitably low price to ensure that they are affordable enough to extend the general life of the unit
- **Warranty or insurance:** Project Lamps shall offer a minimum of a one-year manufacturer warranty as per AMS.III.AR requirements

Technology factors

- **Baseline fuel and technology:** existing data suggests that 90% of lighting needs in Africa are provided by kerosene lamps. Therefore, we have chosen the default baseline fuel as kerosene
- **Charging strategy:** the LED lights can be charged via renewable sources (such as solar etc).

Quality Assurance

- **Quality certified:** The Project Lamps will seek quality certification as part of its expanding business. At present the project lamp units and LED components have manufacturer-specified certificates

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

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



Additionality for this PoA is demonstrated as stipulated in the “*Standard for demonstration of additionality of GHG emission reductions achieved by a programme of activities*” (Version 2, Annex 2, EB 63).

According to the standard, paragraph 7 states that “PoAs that will include one or more micro-scale projects as CPA shall include eligibility criteria derived from all the relevant requirements of the *Guidelines for demonstrating additionality of micro-scale project activities*”.

Demonstration of the above has been done in Section A.4.3 of the PoA-DD and has been done at the PoA level.

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

Each CPA will have to demonstrate that the number of LED lights sold does not exceed the limits of micro-scale projects as mentioned in the *Guidelines for demonstrating additionality of micro-scale project activities*.

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

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Each CPA shall apply the following calculation approach:

Equation 1, Baseline Emissions:

$$BE_y = DV \times GF_y \times DB_y$$



Parameter	Unit	Description	Source
BE_y	tCO ₂ e	Default emissions factor	
GF_y	Number	Number of consumers supplied with Project Lamps	As defined in AMS.III.AR
DB_y	%	<i>Option 1:</i> = 1.0 in the absence of relevant information <i>Option 2:</i> = 1.0 + FFG. FFG is defined as the documented national growth rate of kerosene fuel use in lighting from the preceding 3 or 5 years (depending on the availability of reliable data)	As described in later sections.

Equation 2, Project Emission:

According to the small scale methodology AMS III.AR, Project Emissions (PE_y) will depend on the project lamp charging mechanism utilized.

The methodology states that $PE_y = \text{Zero (0)}$ in the case of Project Lamps whose batteries are charged by:

- (a) renewable energy system (e.g. photovoltaic systems or mechanical systems such as wind battery chargers)
- (b) standalone distributed generation system (e.g. a diesel generator set) or a mini-grid, if the mini grid or distributed generation system is entirely powered by renewable energy generation unit(s).

The project developers whom operate a CPA within the CarbonSoft PoA will exclusively distribute approved LED lamp technology to replace kerosene lamps. Since the Project Lamps use either a renewable or mechanical energy system, the project emissions under this PoA shall be zero.

Equation 3, Emission Reduction:



According to the methodology AMS-III.AR., the annual emissions reductions are calculated as :

$$ER_y = \sum_{i,j} N_{i,j} \times (BE_{y,i} - PE_{y,i,j}) \times (OF_{y,i,j})$$

Parameter	Unit	Description	Value	Source
N_{ij}	Quantity	Number of Project Lamps distributed to end users of type i, with charging method 'j' The emissions reductions shall be considered from the date of completion of distribution of the project lamps to end users	Recorded by CPA and the distributor	CPA reporting and monitoring
$OF_{y,ij}$	%	Percentage of Project Lamps distributed to end users that are operating an in service in year, y	Assumed to be 100%	Assumed based guidance from AMS.III-AR

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

Data / Parameter:	<i>FUR (ID 1)</i>
Data unit:	Litres per hour
Description:	Quantity of kerosene used per hour in household by a kerosene lamp
Source of data used:	Default value provided by AMS-III.AR. or specific value obtained for CPA region through reports/surveys/studies etc.
Value applied:	There are two options for this value: <ul style="list-style-type: none"> • Default value specified in AMS.III.AR: 0.025; or • specific value obtained for CPA region through reports/surveys/studies etc.
Justification of the	The methodology provides default value, however it provides provisions for



choice of data or description of measurement methods and procedures actually applied:	using alternative values based on surveys or reports.
Any comment:	

Data / Parameter:	DV (ID 2)
Data unit:	tCO ₂ e
Description:	Lamp Emission Factor
Source of data used:	Default value as provided in the small-scale methodology AMS-III.AR or as calculated based on Fuel Use Rate derived from literature review specific to the CPA region.
Value applied:	0.08 or value derived based on Fuel Use Rate derived from literature review specific to the CPA region.
Justification of the choice of data or description of measurement methods and procedures actually applied:	The methodology provides default value, however it provides provisions for using alternative values based on surveys or reports.
Any comment:	

Data / Parameter:	h (ID 3)
Data unit:	Hours/day
Description:	Utilization rate: average operating hours are the average operational hours of kerosene lamps in the baseline
Source of data used:	AMS.III.AR (version 2)
Value applied:	3.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	This value is fixed for the duration of the project; unless observed data further qualifies this value
Any comment:	

Data / Parameter:	d (ID 4)
Data unit:	Days
Description:	The number of days the lamp operates for
Source of data used:	AMS.III.AR (version 2)
Value applied:	365, 366 in case crediting year is a leap year
Justification of the	This is a fixed value.



choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>EF (ID 5)</i>
Data unit:	KgCO ₂ / litre
Description:	Fuel emissions factor
Source of data used:	AMS.III.AR (version 2)
Value applied:	2.4
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value provided by small scale methodology AMS-III.AR
Any comment:	

Data / Parameter:	<i>L (ID 6)</i>
Data unit:	Value
Description:	Leakage factor
Source of data used:	AMS.III.AR
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value provided by small-scale methodology AMS-III.AR.
Any comment:	

Data / Parameter:	<i>N (ID 7)</i>
Data unit:	Value
Description:	Number of fuel-based lamps replaced per Project Lamp
Source of data used:	AMS.III.AR
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value provided by small-scale methodology AMS-III.AR.



Any comment:	
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Data / Parameter:	<i>N-G (ID 8)</i>
Data unit:	Value
Description:	Net-to-gross factor
Source of data used:	AMS.III.AR
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value provided by small-scale methodology AMS-III.AR.
Any comment:	

Data / Parameter:	<i>W_i (ID9)</i>
Data unit:	Watts
Description:	Wattage of project lamps distributed to end users, of type <i>i</i>
Source of data used:	Lamp Manufacturer
Value applied:	The data will vary for each Lamp type used in each CPA. The value will be sourced from the lamp manufacturer and will depend on the lamp type used by the particular Project Activity
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>DB (ID10)</i>
Data unit:	Value
Description:	Dynamic Baseline Factor It is the change in baseline kerosene consumption based on reports from national growth rate of the region where the CPA is located.
Source of data used:	Public reports or alternative data sources
Value applied:	The growth rate of the country will be sourced from reliable, official, publicly available data. Conservative change will be considered in case the growth rate of the country where the CPA is located varies over the last few years.
Justification of the choice of data or	The growth rate of the country will have a direct effect on the consumption of kerosene in non-grid connected areas. Hence growth rate is a perfect measure to



description of measurement methods and procedures actually applied:	gauge increase in kerosene consumption.
Any comment:	

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

Data / Parameter:	n_i (ID11)
Data unit:	Quantity
Description:	Number of units sold
Source of data to be used:	CPA Project
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Project developer database
Description of measurement methods and procedures to be applied:	The number of units distributed per project year is aggregated from records available with the CME, which have been provided quarterly by the CPA participants.
QA/QC procedures to be applied:	Data will be collected by the project developer. CarbonSoft will be responsible to store the data for the crediting period and an additional two years.
Any comment:	This sales data, in its detailed form, is considered by project developers to be commercially sensitive information. The information will be provided to the DOE, and as required aggregated data can be made available. CarbonSoft will treat all detailed sales data as commercially confidential information.

Data / Parameter:	D_{intro} (ID 12)
Data unit:	Date
Description:	The date that the Project Lamp was distributed, rounded to the 1 st of the month following. This number is required to conservatively calculate the emission reductions for a verification period.
Source of data to be used:	Sale records available with CPA project implementer, where each Project Lamp has an Identification Number.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	E.g., 01/03/2011
Description of measurement methods	Data will be automatically rounded based on the exact date of the sale being input to the database.



and procedures to be applied:	
QA/QC procedures to be applied:	Data will be collected by the project developer. CarbonSoft will be responsible to store the data for the crediting period and an additional two years.
Any comment:	

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

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

Data / Parameter:	n_j (ID11)
Data unit:	Quantity
Description:	Number of units sold
Source of data to be used:	CPA Project
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Project developer database
Description of measurement methods and procedures to be applied:	This will be monitored monthly by the CPA project developer and will be maintained in a database. The CPA project developer will provide quarterly updates to the CME. Only project lamps with CPA identification provided by the CPA will be included.
QA/QC procedures to be applied:	Data will be collected by the project developer. CarbonSoft will be responsible to store the data for the crediting period and an additional two years.
Any comment:	

Data / Parameter:	D_{intro} (ID 12)
Data unit:	Date
Description:	To be conservative, the date that the Project Lamp was purchased, rounded to the 1 st of the month following. This number is required to conservatively calculate the emission reductions for a verification period.
Source of data to be used:	GI (ID 12)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	E.g., 01/03/2011
Description of measurement methods	Based on the exact date of sale being input to the database, data will be automatically rounded up to the 1 st of the following month.



and procedures to be applied:	
QA/QC procedures to be applied:	Data will be collected by the project developer. CarbonSoft will be responsible to store the data for the crediting period and an additional two years.
Any comment:	

Data / Parameter:	<i>Lamp Wattage (ID 13)</i>
Data unit:	Watts
Description:	Wattage of the lamp distributed
Source of data to be used:	Project Developer Database for lamps sold
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.3
Description of measurement methods and procedures to be applied:	The lamp wattage for the lamps sold will be provided by the manufacturer and will be recorded by the CME against sales records
QA/QC procedures to be applied:	The data will be verified with certificates provided by the lamp manufacturer.
Any comment:	

Data / Parameter:	<i>Battery Type (ID 14)</i>
Data unit:	NA
Description:	The type of Battery present in the Solar LED light distributed
Source of data to be used:	Project Developer Database for lamps sold
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable
Description of measurement methods and procedures to be applied:	The lamp battery type for the lamps sold will be provided by the manufacturer and will be recorded by the CME against sales records.
QA/QC procedures to be applied:	The data will be verified with certificates provided by the lamp manufacturer.
Any comment:	

Data / Parameter:	<i>Charging Method (ID 15)</i>
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Data unit:	NA
Description:	The method charging the batteries for the Solar LED lights
Source of data to be used:	Project Developer Database for lamps sold
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable
Description of measurement methods and procedures to be applied:	Only Solar LED lights will be included under the PoA and hence all lamps sold within the CPA will use solar energy to charge the battery.
QA/QC procedures to be applied:	The data will be verified with certificates provided by the lamp manufacturer.
Any comment:	

In addition to these parameters if the CPA is claiming CERs for a period of 7 years, the following additional parameters will also be monitored:

Data / Parameter:	n_o (ID 16)
Data unit:	Quantity
Description:	Number of units in operation and in service
Source of data to be used:	Survey to determine number of Project Lamps in the 3 rd year of the lamps distribution (i.e., the third year of the ‘vintage’) Sampling survey results shall be utilised as the operating assumptions for years 4,5,6 and 7 for Project Lamps in the CPA.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Project developer database
Description of measurement methods and procedures to be applied:	The number of units in operation and in service is found through monitoring and shall be presented as a percentage (%). Only Project Lamps with Unique Identification numbers provided by the CPA will be included.
QA/QC procedures to be applied:	Data will be collected by the project developer. CarbonSoft will be responsible to store the data for the crediting period and an additional two years.
Any comment:	

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

According to the methodology AMS-III.A.R the parameters monitored by an individual CPA will be determined by which crediting option is chosen:



Option 1: Project Lamps are assumed to operate for two years after project lamp distribution to end-users. Therefore, emission reductions can only be claimed for two years;

Option 2: Project Lamps are assumed to operate for seven years after project lamp distribution to end-users, and thus emission reductions can be claimed for up to seven years per project lamp.

For CPAs that choose Option 1 of the methodology the Project Activity will record the following data:

1. Number of lamps distributed to end users under the project activity, identified by the type of project lamps (lamp wattage, battery type, charging method, the date of supply).

The following database will be operated and maintained to ensure completeness and accuracy of monitoring information:

- **Sales record (SR):** Project Lamp systems deployed sales records

Each Project Lamp distributed will only be eligible to generate emission reductions for a period of two years from the date of distribution.

The table below shows the main characteristics of each database: parties involved, periodicity and format.

	Project lights deployed sales records (SR)
Parties involved	Primary data collection: project developer Database maintenance: project developer
Periodicity	Continuous
Format	Paper or electronic for primary data Electronic database
Data saving	All data shall be saved for the whole crediting period, plus an additional two years

The Sale Record (SR)

The Sales Record (SR) database has been established and shall contain the following information:

- Quantity of lamps sold
- Date of sale provided by distributor
- Lamp wattage for each lamp
- Battery Type for each lamp
- Charging method for each lamp

The purpose of SR database is to provide enough information to enable full monitoring for each monitoring period.



For CPAs that choose Option 2 of the methodology the project developer will record the following data:

1. Number of lamps distributed to end users under the project activity, identified by the type of project lamps (lamp wattage, battery type, charging method, the date of supply).
2. Number of lamps in use and operational within the CPA boundary

The following database will be operated and maintained to ensure completeness and accuracy of monitoring information:

- **Sales record (SR):** Project light systems deployed sales records
- **Sample database (DB i,a):** sample database for deployed Project lights
- **Periodic check A (SG i,v):** regular review of sample group for monitoring of deployed Project Lamps

A Sales Record will be kept similar to the one described above.

Project lights deployed sales records (SR)	
<i>Parties involved</i>	Primary data collection: project developer Database maintenance: project developer
<i>Periodicity</i>	Continuous
<i>Format</i>	Paper or electronic for primary data Electronic database
<i>Data saving</i>	All data shall be saved for the whole crediting period, plus an additional two years

The Sale Record (SR)

The Sales Record (SR) database has been established and shall contain the following information:

- Quantity of Lamps lamps sold
- Serial number of lamps delivered to distribution point
- Date of sale provided by distributor
- Lamp wattage for each lamp
- Battery type for each lamp
- Charging method for each lamp
-

In addition, CPAs projects that choose **Option 2** will conduct monitoring surveys in the third year of the lamp being distributed at the CPA level to determine the percentage of Project Lamps distributed to end users that are operating and in service during the third year of the crediting period.

The following are the principles that need to be met during periodic monitoring for lamps sold under Option 2 and the ways project developers shall collect sampling information:

1. Only Project Lamps with an original unique marking can be counted as operating and in service.



CarbonSoft will ensure that each lamp sold under the CPA will have a Unique Identification Number, which will be suitably placed on each Project Lamp. Following sampling, only those lamps with the number will be counted as operating and in service.

2. While Project Lamps replaced as part of a regular maintenance or warranty program can be counted as operating, project lamps cannot be replaced as part of the survey process and counted as operating

The monitoring and replacement groups will be kept separate. At the time of monitoring, no replacement will take place to ensure such lamps are not counted.

3. The sampling size is determined by minimum 90% confidence interval and the 10% maximum error margin; the size of the sample shall be no less than 100.

A detailed sampling plan has been described at the end of this section to ensure minimum of 90% confidence level and up to a 10% margin of error.

4. The survey will be conducted by site visits

A survey form is being created for the process and will be used to gather information from the end users at the time of monitoring by carrying out door-to-door site visits.

5. Only persons over age 12 will be interviewed

At the time of monitoring, a head of the household, will be interviewed. In case this is not possible, other adults in the household will be interviewed. In no scenario, will any person under 12 be interviewed.

6. The CPA design document will describe in detail the survey design for gathering the above information.

The CPA-DD will describe the survey design for gathering the information required for monitoring.

7. The survey has a random distribution and is representative of target population (e.g., size, location)

A detailed sampling plan has been described at the end of this section to ensure random distribution.

8. The method to select respondents for interview is random

A detailed sampling plan has been described at the end of this section to ensure random sampling.

Sampling Plan and Procedure



The SSC-CPA implementation entities utilizing Option 2 and claiming CERs for a period of 7 years will follow the guidelines stipulated by the latest version of the “*Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities*” (EB 65, Annex2). The SSC-CPA will provide how the CPA conforms to the following in the CPA-DD.

Objectives of the Plan:

The following will be the outline of the sampling and monitoring plan prepared by a SSC-CPA utilizing **Option 2** defined in paragraph 2 of the methodology AMS-III.A.R. The goal of this plan is to determine number of project lamps in service and operating under the project in a given year. The lamps distributed will have a unique marking, and only those lamps with the marking will be counted to ensure lamps from other projects are not counted.

Since the project activity is spread out over a large area, monitoring each and every lamp is not a feasible option and hence a sample size is considered. According to the methodology, *the sampling size is determined by minimum 90% confidence interval and the 10% maximum error margin and the size of the sample shall be no less than 100.*

Hence the sampling plan provided by the SSC-CPA aims at counting the number of Project lamps in use during the crediting period across the CPA, using a 90/10 confidence precision.

Target Population:

The target population will be all the households across a given CPA, that have been distributed lamps to replace use of kerosene lamps for lighting.

Parameters of the Sampling Plan:

A multi stage procedure will be followed. According to guidelines,

“Multistage sampling is a complex form of cluster sampling. Using all the sample elements in all the selected clusters may be prohibitively expensive or not necessary. Under these circumstances, multistage cluster sampling becomes useful. Instead of using all the elements contained in the selected clusters, the researcher randomly selects elements from each cluster. Constructing the clusters is the first stage. Deciding what elements within the cluster to use is the second stage.”

The model adopted will be a two-stage model:

Stage I: This would involve dividing the entire project area into clusters, which typically would be sales points and then, selecting a sample of clusters for survey. Product-type distribution would also be taken into consideration while forming clusters.

Stage II: This would involve selection of a sample of lamps from each selected sample cluster for monitoring.

The aim of the plan is to check continued operation of sampled lamps and identification of user and checking with customer database. The sample survey will be carried out through direct household interviews or user feedback forms.

Sample Size:



The sampling size will be calculated using Cochran's formula as follows:¹²

$$1. \quad SS = (Z^2 * p * (1-p)) / (c^2)$$

where,

SS = Sample Size

Z = Z value (e.g. 1.645 for 90% confidence level)

p = estimated percentage of the population possessing attribute of interest =0.5

c = acceptable margin of error = 0.1

Correction is done for a finite population based on the following formula:

$$\text{New SS} = SS / (1+(SS/P))$$

where,

SS = Sample Size

P = Population

After the sample size has been determined for the CPA using Option 2, the actual survey will be carried out by the CPA implementation agency.

Data Measured:

The objective of the monitoring for option 2 will be to check number of lamps operational during the crediting period. The number of sample households that will be visited will be calculated by the CPA implementation agency as described above. The following will the parameter monitored:

Parameter	Unit	Description
n _o	Quantity	Number of units in operation and in service

Quality Assurances:

¹² <http://www.surveysystem.com/sample-size-formula.htm>



The SSC-CPA implementation agency in its monitoring and sampling plan provided with the CPA-DD will ensure proper quality control methods are prescribed to ensure that data gathered is error free. An overall quality control and assurance strategy shall be documented in the plan. This shall include a procedure for defining outliers and under what circumstances outlier data/measurements may be excluded and/or replaced.

The implementation agency will also provide information on each of the following in the CPA-DD:

- 1) Training of field personnel,
- 2) provisions for maximizing response rates
- 3) Documenting out-of-population cases
- 4) Refusals
- 5) Other sources of non-response, and related issues.

Implementation Plan:

The implementation plan will be provided in the CPA-DD for those CPAs utilizing Option 2 wherein the actual timelines of the sampling effort will be described. It will also contain a general description of qualifications and experience of personnel who will be engaged and if possible listing specific names, qualification and experience.

The CPA implementation agencies will ensure that all recommendations provided in the Annex 4 of the Guidelines for unbiased estimates of sampled parameters will be followed.

The monitoring protocol which describes in further detail, how data will be monitored has been provided to the DOE.

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

Date: 10/09/2011

Name: Mr. Sebastian Foot

Organisation: CarbonSoft Corporation Ltd. (Project Participant)



Annex 1

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and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES**

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



CDM – Executive Board

page 41

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION
