



**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):

>>

Southern African Solar LED Programme

Date: 13/01/2012

Version number: 1.1

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

>>

The purpose of this PoA is to replace fossil fuel based lighting with Solar LED based lighting in Southern Africa, at a domestic level. The PoA will result in reduced associated GHG (specifically CO₂) emissions in Southern Africa through the use of solar energy replacing the combustion of fossil fuels (specifically kerosene). In addition the PoA will also contribute to sustainable development within each of the Countries included in the PoA (discussed under point 2 below).

1. General operating and implementing framework of PoA

Africa accounts for a major share of the un-electrified. Research by Lighting Africa suggests that of the approximately 110 million off-grid households across Africa, more than half use kerosene¹ lamps as their primary light source, with many needing several sources to fill their lighting needs². Small scale CPAs under this proposed PoA will be implemented by ToughStuff International Ltd. (hereafter referred to as ToughStuff International) and other companies/organisations operating within the PoA project boundary.

This small scale PoA is a programme for the replacement of fossil fuel based lighting (with a focus on kerosene lighting) with solar LED lighting (thereby reducing greenhouse gas (GHG) emissions) at a domestic scale including both residential and non-residential settings. This programme spans 8 Southern African countries including South Africa, Mozambique, Zimbabwe, Botswana, Namibia, Zambia, Malawi and Angola (hereafter referred to as the Countries). The PoA is an initiative undertaken by ToughStuff International. The PoA will be coordinated and managed by ToughStuff International acting as the Coordinating/Managing Entity (CME).

A typical technology employed within each CPA – a solar LED lamp - will consist of a solar photovoltaic (PV) panel, electronic circuits, storage battery and LED lamp. The solar PV panel captures solar energy and converts it into electrical energy which is then stored in the battery. The lamp draws electricity from the battery and provides light.

Sustainable Development:

The use of fossil fuel based lighting has numerous adverse sustainable development (environmental, economic and social) effects. These are discussed below.

¹ Reference 1

² Reference 2



Access to electricity and CO₂ emissions:

Energy alone is not sufficient for creating the conditions for economic growth, but it is certainly necessary. Access to electricity is particularly crucial to human development as electricity is, in practice, indispensable for certain basic activities, such as lighting, refrigeration and the running of household appliances, and cannot easily be replaced by other forms of energy. Individuals' access to electricity is one of the most clear and un-distorted indication of a country's energy poverty status³. Furthermore, based on the World Energy Outlook data, it is estimated that in 2009 in Sub-Saharan Africa only 31% of the population had access to electricity.

The table below provides the estimated electrification rate and population without electricity (millions) in 2009⁴ for those countries to be included in this PoA.

Table 1: Estimated electrification rate and population without electricity

Country	Electrification rate (%)	Population without electricity (millions)
South Africa	75	12.5
Malawi	9	13.9
Angola	26.2	13.7
Mozambique	11.7	20.2
Zimbabwe	41.5	7.3
Botswana	45.4	1.1
Namibia	34.0	1.4
Zambia	18.8	10.5

According to the Global Environment Facility⁵, global lighting-related CO₂ emissions are estimated at 1,900 million tonnes and equivalent to approximately 8% of global emissions. As electrification increases this amount is set to increase correspondingly.

Costs of and access to efficient lighting systems:

With limited access to electricity households and communities turn to fossil fuel based lighting. While the levels of illumination provided by fossil fuel flame based lamps are far lower than with modern electric lighting, the efficiency of fuel-based light production is also low. The result is a substantial amount of primary energy use with little service received in return⁶. Furthermore, for individual households, the cost of kerosene is a burden and is far more expensive than electric lighting. Mills' study describes how the cost per useful lighting energy quality (\$/lumen-hour of light) for kerosene lighting is 325-times higher than that for "inefficient" incandescent lighting and 1625-times higher than for compact-fluorescent lighting. To put these numbers in perspective, the total annual light consumption (about 12000 lumen-hours) in a typical un-electrified household is equivalent to that produced by a 100-watt incandescent bulb in 10 hours. While households lit with flame-based lighting spend approximate the same amount of money each year on lighting (approximately \$100/year), they receive far less than one percent as much lighting quality as their counterparts in electrically-lit homes in IEA (International Energy Agency)

³ Reference 3

⁴ Reference 4

⁵ Reference 5

⁶ Reference 6



countries. To further put this cost in perspective, this research was done when oil prices were between US\$20-40 per barrel while currently oil prices are substantially higher.

There are a wide variety of fuel-based light sources, including candles, oil lamps, ordinary kerosene lamps, pressurized kerosene lamps, biogas lamps, and propane lamps. According to most studies, ordinary wick-based kerosene lamps are the most common type of fuel-based lighting in developing countries. Ironically, more efficient kerosene lamps tend to increase both light output and fuel consumption, whereas an efficient electric compact fluorescent lamp provides an eight-fold reduction in primary energy consumption compared to standard incandescent light sources⁷.

Health, safety and productivity in domestic lighting:

The lack of electricity and low quality lighting provided by fossil fuel based lighting restricts household productivity in various ways^{8,9}, for example:

1. Lighting may be restricted and provided only by the fire, candles, or simple kerosene wick lamps which can be a significant source of pollution.
2. The lack of light restricts activities in the home, including children's homework, reading and opportunities for income generating activities.
3. Lack of access to electricity restricts the use of a wide range of appliances that can contribute to food safety (refrigerators), communication/education, leisure (radio, TV), and economic activity.

Furthermore, the use of these lighting sources for domestic lighting is widely associated with harmful indoor air pollution. As a product of the combustion reaction, gases such as sulfur dioxide, carbon monoxide and carbon dioxide are produced. Kerosene lamps are a preferred lighting option for the rural and urban poor; and with no or limited access to electricity, this demographic often live in poorly ventilated and crowded living conditions. The use of these fuels in homes with poor or no ventilation is particularly troublesome because this smoke has been associated with a variety of negative health outcomes, including pneumonia, chronic obstructive pulmonary disease (COPD) and lung cancer¹⁰. Besides ingestion and subsequent poisoning, other safety issues contribute to health risks, for example, kerosene related fires, burns and other related injuries¹¹.

Positive contribution to sustainable development:

Taking into account the numerous adverse sustainable development (environmental, economic and social) effects of fossil fuel based lighting; this PoA will provide a positive contribution to sustainable development in each of the Countries (South Africa, Mozambique, Zimbabwe, Botswana, Namibia, Zambia, Malawi and Angola) in the following ways.

Environmental:

⁷ Reference 7

⁸ Reference 8

⁹ Reference 9

¹⁰ Reference 10

¹¹ Reference 11



1. Reduction of anthropogenic CO₂ emissions associated with the use of fossil fuel based lighting applications, specifically kerosene lamps as the LED lamps /lanterns are solar charged.
2. Reduction of indoor air pollution associated with the use of fossil fuels for the use of lighting.

Economic:

1. Domestic savings realised from the diminished consumption of fossil fuels for lighting purposes.
2. Domestic savings on medical bills/fees traditionally attributed to illnesses and injuries associated with the use of fossil fuels for lighting purposes.
3. Reduced financial losses associated with lack of productivity due to illnesses and injuries associated with the use of fossil fuels for lighting purposes.

Social:

1. Improved domestic lighting with increased lumen output as compared to kerosene lamps and fossil fuel based lighting. While there are a variety of models, arrays and types of LED lamps, it is a widely acknowledged fact that the typical LED Lantern produces greater quality useful light than the typical Kerosene lantern. This figure according to some reports is as high as 200 times better light than fuel based lighting systems¹².
 - a. This will providing a better environment for children to study in devoid of the low quality lighting and eye irritation previously witnessed with traditional based kerosene lamps.
 - b. The improved lighting will also allow for greater opportunities for income generating activities that do not currently take place.
2. Increased awareness on the use environmentally friendly lighting applications and the adverse effects of traditional fossil fuel lighting applications creating social awareness on the need to conserve the environment and the health of families.

2. Policy/measure or stated goal of the PoA

The stated objective of this PoA is to increase dissemination of solar charged, LED based lighting applications at the domestic level, replacing the use of fossil fuels and associated lighting applications. The PoA will result in reduced associated GHG (specifically CO₂) emissions in Southern Africa through the use of solar energy replacing the combustion of fossil fuels (specifically kerosene). In addition the PoA will contribute to sustainable development within the Countries in the ways described under point 1 above. Carbon revenues will be used to stimulate sales by reducing the Solar LED lantern price point and associated costs of marketing and promotion.

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

¹² Reference 12



The CME (ToughStuff International) herein affirms that the proposed PoA is a voluntary action. There are no policies or statutes prompting any individuals to use solar charged LED lamps in households or communities within the Countries. All participation of the stakeholders to this PoA is voluntary.

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

>> The following information shall be included here:

1. Coordinating or managing entity of the PoA as the entity which communicates with the Board

ToughStuff International Ltd.

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.

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 a project participant (Yes/No)
South Africa	Host Party	No
Malawi	Host Party	No
Angola	Host Party	No
Mozambique	Host Party	No
Zimbabwe	Host Party	No
Botswana	Host Party	No
Namibia	Host Party	No
Zambia	Host Party	No
Tough Stuff International Ltd	Coordinating/ Managing Entity	Yes
EcoMetrix Africa (Pty) Ltd	CDM Consultant	No

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

>>

This small scale PoA is a programme for the replacement of fossil fuel based lighting (with a focus on kerosene lighting) with solar charged LED lighting at a domestic residential and non-residential scale.

The geographical boundary is discussed in section A.4.1.2 and the technical details of the solar charged LED lamps are discussed in section A.4.2.1.

A.4.1. Location of the programme of activities:

>>



The PoA is located on the southern tip of Africa and comprises 8 African nations (the Countries), of which 4 are considered by the UN to be least developed countries¹³ (Zambia, Mozambique and Malawi, Angola).

A.4.1.1. Host Party(ies):

>>

South Africa
Malawi*
Angola*
Mozambique*
Zimbabwe
Botswana
Namibia
Zambia*

*Denotes Least Developed Country

A.4.1.2. Physical/ Geographical boundary:

>>

The boundary of the PoA is defined as the geographical area within which all the implemented small-scale CDM programme activities (SSC-CPAs) included in the PoA will occur. All CPAs under this PoA will be within the borders of the Host Parties listed in A.4.1.1 (listed above).

¹³ Reference 13



Figure 1: SASL PoA boundary



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

>>

A typical SSC-CPA will be implemented within the territorial limits of the physical/geographical boundary to which the proposed PoA is confined. To prevent double counting the SSC-CPAs will not overlap the territory identified by other SSC-CPAs included in the proposed PoA. Furthermore each CPA and the individual lamps distributed in each will be appropriately identified separately in line with the methodology. As a small scale PoA, each SSC-CPA will be required not to exceed the 60,000 tCO₂e annual cap for small scale project activities. The CPAs will be required to comply with the provisions of the baseline and monitoring methodology provided for in AMS III.AR. v2.0 EB65 - Substituting fossil fuel based lighting with LED/CFL lighting systems.

A typical CPA is a voluntary initiative with a specific focus on the replacement of fossil fuel (kerosene) based domestic lighting systems with solar charged LED lamps in residential and non-residential settings. Carbon revenues will be used to stimulate sales by reducing the Solar LED lamp price point and associated costs of marketing and promotion. A typical technology employed within each CPA – a solar LED lamp - will consist of a solar photovoltaic (PV) panel, electronic circuits, storage battery and LED lamp. The solar PV panel captures solar energy and converts it into electrical energy which is then stored in the battery. The lamp draws electricity from the battery and provides light.

Throughout the lifetime of the PoA it is envisioned that several CPAs will continue to be included under the PoA. Monitoring for each of these CPAs will be conducted according to the monitoring plan herein described.



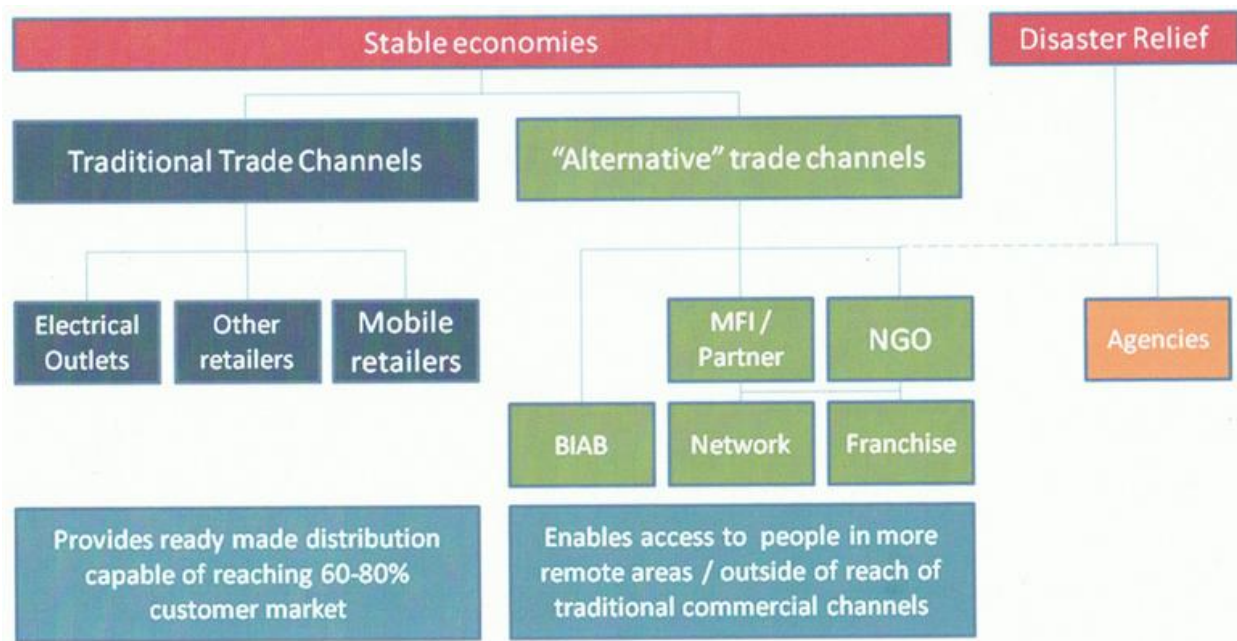
CPA implementing entities will approach distribution in accordance with the monitoring methodology, where considerations of maintenance of the sales record, unique identification of the lamps distributed, and CER Transfer Agreements are necessary and critical.

Implementation and Distribution Strategies for typical CPAs under the proposed PoA:

Distribution:

While lamp distribution models are entirely at the discretion of the CPA implementing entity, several proposed models, as defined in the following figure and associated text, are recommended as they have proven successful in the Sub Saharan region.

Figure 2: Proposed Distribution Channels



ToughStuff International’s distribution plan is designed for Sub Saharan Africa. The distribution approach is being replicated in countries ToughStuff International has a presence in and where ToughStuff International are planning to operate. In order to widely distribute ToughStuff International’s products, trade channels are utilised. Partnerships with traditional trade channels allow large scale distribution of the product throughout the country allowing for the stocking of the product in retail outlets nationwide, specifically targeting Electrical and mobile outlets. Alternative trade channels are essential in reaching consumers in the "last mile" that is those that are the most rural and hard to reach. To this end ToughStuff works with NGOs, MFIs as well as having engineered its own entrepreneur programme named "Business in a Box" (BIAB).

"Business-in-a-Box" is a business model that distributes solar products to rural areas farthest from the grid through training "solar entrepreneurs" to sell the products in their own communities. Not only do the hardest-to-reach customers save \$100 per year by having access to clean solar energy, but solar entrepreneurs increase their income by earning a margin for each kit sold. Business-in-a-Box includes product, sales, and marketing training as well as ongoing monthly support from ToughStuff International to the entrepreneurs. This is an extension of ToughStuff International's Alternative Trade Chanel strategy to partner with not-for-profit organisations to reach members of their network. The members of not-for-profit networks such as community health workers, farmers, cooperatives, and village savings and loan groups have all benefitted by selling solar kits into their communities alongside their usual income generating activities.

Awareness and Promotion:

CPA implementing entities may conduct promotion campaigns and public meetings to create awareness for the use of the Solar LED systems. These may be conducted as many times as the implementing entity so wishes, as this option is left to his direction depending on the target locations in which he wishes to implement the CPA.



A proposed mechanism for these proposed promotion mechanisms is that they be conducted amongst Community Based Organizations, (CBOs), Religious groups, Women’s groups and other community Welfare organizations. These organizations have been identified as pivotal to the organizational structure for fees collection and member organization.

Payment:

The greatest impediment to the implementation of the solar LED Lighting systems is the high ‘up-front’ cost associated with the purchase of such systems. At the discretion of the CPA implementing entity, the option of instalment based payment schemes is available. CPA implementing entities are encouraged to take advantage of creative payment solutions such as mobile cash transfer systems that facilitate easier payments over a secure platform.

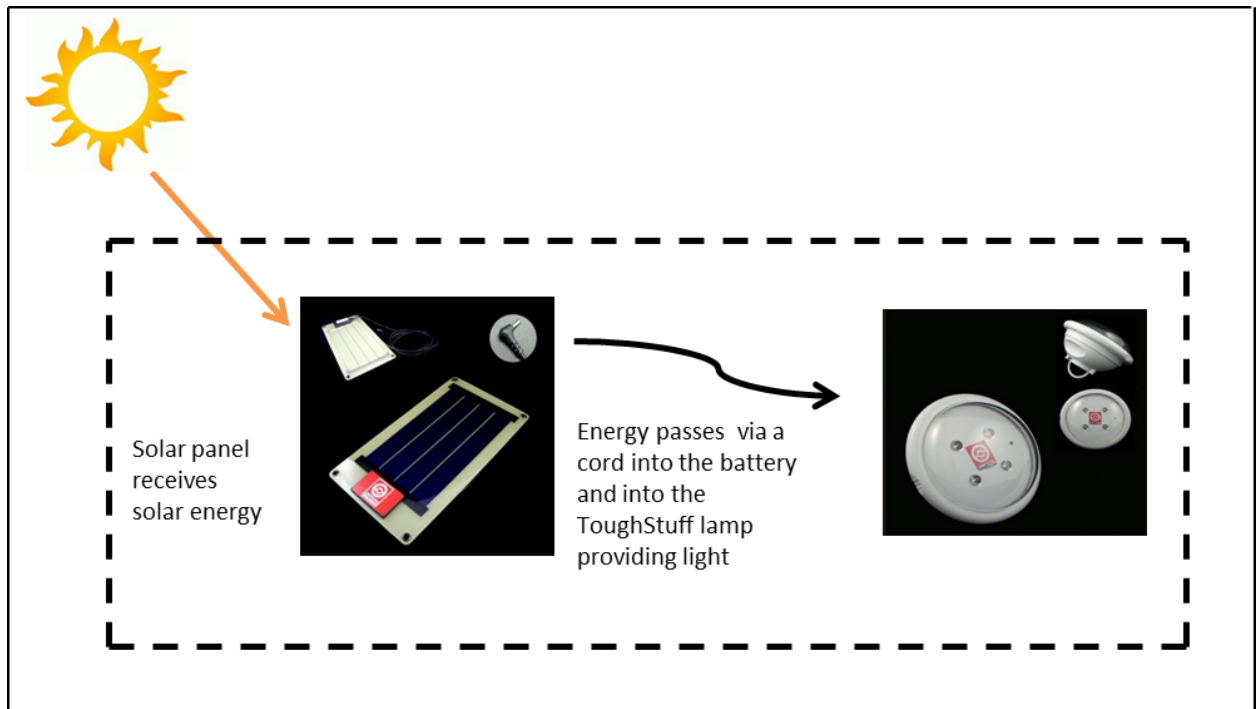
A.4.2.1. Technology or measures to be employed by the <u>SSC-CPA</u>:
--

>>

Each CPA will provide technical descriptions and technical details of the solar LED lamp/lantern technology at the CPA-DD level. The solar LED lighting systems to be used should displace the use of kerosene lamps at a residential/non-residential domestic level.

A typical technology employed within each CPA (LED lamp) will consist of a solar photovoltaic (PV) panel, electronic circuits, storage battery and LED lamp. The solar PV panel captures solar energy and converts it into electrical energy which is then stored in the battery. The lamp draws electricity from the battery and provides light.

Figure 3: Line diagram of typical LED lamp technology



The lamps included under any CPA of this PoA shall meet the eligibility requirements specified in AMS III.AR. v2.0 EB65 and section A.4.2.2 below. Each CPA-DD shall describe the design specifications (certified by manufacturers) of the project lamps included in the CPA using the following table:

Table 2: Table of design specification of the project lamps to be completed in each CPA

Parameter:	Details to be completed for each type of project lamp in each CPA:
Rated average life of the lamp (time at which the lamp's initial light output will decline by no more than 30%)	<i>i.e. 5,000 hours for option 1, paragraph 11 of the methodology or 10,000 hours for option 2, paragraph 12 of the methodology</i>
Lamp's battery charging circuit efficiency at time of purchase	<i>i.e. $\geq 50\%$</i>
Duration of warranty (years) (At a minimum, the warranty shall cover free replacement or repair of any failed lamps, batteries and where applicable solar panels)	<i>i.e. minimum 1 year</i>
Light output (lumens)	<i>e.g. Luminous flux of 20 lumens or illuminance of 25 lux over an area $\geq 0.1 \text{ m}^2$ when suspended at a distance of 0.75 meters or self-supported.</i>
Daily Burn Time (DBT) (hours)	<i>i.e. equal to or greater than 3.5 hours</i>
Autonomous Time (% of DBT)	<i>i.e. $\geq 150\%$ of the DBT</i>
Solar Run Time (SRT) (when charging with solar)	<i>i.e. for the Project Lamp in each month of the year</i>



PV) (hours)	<i>shall be greater than or equal to DBT</i>
Amount of time to fully charge the product (hours)	<i>e.g. 8 hours sunlight or 7 hours stable power charging</i>
Lamp wattage (watts)	<i>e.g. 0.24W</i>
Type of the renewable energy system charging the batteries	<i>e.g. Solar PV</i>
Rated Capacity of the renewable energy system charging the batteries	<i>e.g. 1Wp solar panel x 2</i>
Type of batteries being charged by the renewable energy system (e.g. NiMH, Lead-Acid, Li-ion)	<i>e.g. NiMH</i>
Rated Capacity of the batteries being charged by the renewable energy system (Ampere Hours)	<i>e.g. 1.5 Ampere Hours (Ah)</i>
Type of charge controller (e.g. active or passive)	<i>e.g. Passive</i>
Physical protection against environmental factors	<i>e.g. Meets, IEC 60529 - IP41</i>

The implementing entity of each CPA is encouraged to improve upon the solar LED lamp design through internal research and development. Alternative designs/models to those described in each CPA upfront will also be eligible under the PoA, as long as they meet the eligibility criteria for inclusion as per section A.4.2.2 of this PoA-DD.

The solar lamps are designed to meet domestic lighting needs at a price point that is feasible without compromising the quality of useful light and lifetime of the lamps.

Certain systems included in a CPA may provide mobile phone charging components as well as radio chargeable batteries. These components will always be seen as additional to the project scope and only emission reductions realized from displacement of the kerosene use for lighting will be calculated in each CPA.

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

>>

Any options discussed in this section (e.g. option 1 of paragraph 11 or option 2 of paragraph 12 refer to those numbered paragraphs provided in AMS III.AR. v2.0 EB65.

For inclusion in the proposed PoA, each CPA must demonstrate the following:

1. The CPA will implement LED based lighting lamps in residential/non-residential settings with the objective of displacing fossil fuel based lamps.
2. The LED based lighting systems will have batteries which are charged using a renewable energy system included as part of the project lamp (e.g. a photovoltaic system).
3. The CPA project proponent must provide manufacturer certification attesting that the lamps have a rated average life (rated average life is the life 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%) of at least:
- a. 5,000 hours (if option 1 paragraph 11 is chosen i.e. emission reductions are claimed for 2 years after distribution), as well as the battery charging circuit efficiency, at the time of purchase, being at least 50%. Or
 - b. 10,000 hours (if option 2 paragraph 12 is chosen i.e. emission reductions are claimed for 7 years after distribution), as well as the battery charging circuit efficiency, at the time of purchase, being at least 50%.
 - c. If option 2 paragraph 12 is chosen then details on how the project lamps meet the requirements of points 12 a) – e) must be provided.
4. All lamps must have one year warranty (at a minimum, the warranty shall cover free replacement or repair of any failed lamps, batteries and where applicable solar panels).
 5. Project Lamps shall meet or exceed the following minimum performance characteristics, which should be proven by third-party test results and presented within each CPA:
 - a. Light Output: Luminous flux of 20 lumens or illuminance of 25 lux over an area $\geq 0.1 \text{ m}^2$ when suspended at a distance of 0.75 meters or self-supported. The light output over a 2,000 hour lumen maintenance test should not decline by more than 20% for Option 1 (paragraph 11) or 15% for Option 2 (paragraph 12);
 - b. Run Time and Battery Capacity: Daily Burn Time (DBT) shall meet the following requirements:
 - i. DBT shall be equal to or greater than 3.5 hours;
 - ii. For charging option 2(a) (prescribed) the Autonomous Time of the Project Lamps shall meet the following requirements:
 - For Option 1, paragraph 11, the Autonomous Time shall be equal to or greater than 150% than the DBT of the Project Lamps;
 - For Option 2, paragraph 12, the Autonomous Time shall be equal to or greater than 150% of the DBT of the Project Lamps;
 - iii. For charging with solar PV under option 2(a) the Solar Run Time for the Project Lamp in each month of the year (as determined per paragraph 7(g)) shall be greater than or equal to the DBT;
 6. Each CPA-DD shall include the minimum requirements for the design specifications of project lamps such as including the following specifications:
 - a. Lamp wattage (in Watts) and luminous flux output (in lumens);
 - b. Rated lamp life (in hours);
 - c. Where applicable, the type and rated capacity of the renewable energy equipment used for battery-charging (in Watts);
 - d. Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere Hours);
 - e. Type of charge controller (e.g. active or passive);
 - f. Autonomous Time and Daily Burn Time;
 - g. Solar Run Times(s) (SRT) for products with solar energy charging systems. If regional solar data are available, the maximum, minimum and average estimated SRT values for each



- month of a typical year shall be provided. If regional solar data are not available the standard solar day (5 kWh/m²) shall be used to estimate SRT;
- h. Where applicable, the amount of time to fully charge the product;
 - i. Physical protection against environmental factors weather impacts (e.g. rain, heat, insect ingress).
7. Each CPA-DD shall explain the proposed method of distribution method of the project lamps. It shall also explain how the proposed project activity will:
 - a. Ensure that the replaced baseline lamps are those that directly consume fossil fuel (use documentation of the common practice of fuel usage for lighting in the project region e.g. representative sample surveys/official data/ peer reviewed literature;
 - b. Eliminate potential double counting of Emission Reductions that could occur, for example, if more than one entity (e.g. lamp manufacturers, suppliers of solar and/or battery equipment, etc. or others) claims credit for Emission Reductions for the project lamps. At a minimum, project lamps shall be marked as CDM project lamps and be accorded unique identification number s;
 - c. Ensure compliance with prevailing regulations pertaining to the use and disposal of batteries within the respective Countries.
 - d. A maximum of 5 lamps will be distributed per household/ non-residential setting per CPA.
 - e. Individual SSC-CPA will not exceed 60,000 tCO₂e annually in its emissions reductions.
 8. Each SSC-CPA must implement the baseline and monitoring methodology AMS III.AR. v2.0 EB65.
 9. In terms of additionality, the SSC- CPA must demonstrate that it lies within one of the Countries, and thus suffers the investment barrier as described in Section A.4.3 of this PoA-DD, thus demonstrating the additionality of the CPA.
 10. The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA making use of the CPA database. Further, that double counting of individual units is prevented using the Sales Database as described in the monitoring plan.
 11. Local stakeholder consultation and analysis of environmental impacts will take place at SSC-CPA level.
 12. The SSC-CPA will implement the monitoring plan (including sampling and surveys) as described Sections A.4.4.1 and E.7.2 in this PoA-DD.
 13. The SSC-CPA will meet the requirements of the debundling check as described in Section A.4.4.1.



14. Each SSC-CPA must be approved/validated by the coordinating entity and DOE prior to its incorporation into the PoA.

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):

>>

The proposed PoA is a voluntary coordinated action

The CME (ToughStuff International) herein affirms that the proposed PoA is a voluntary action. There are no policies or statutes prompting any individuals to use solar charged LED lamps in households or communities within the Countries. All participation of the stakeholders to this PoA is voluntary.

If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA

Small-scale projects must demonstrate that they would not be implemented in the absence of CDM registration as a result of one or more barriers. A simplified baseline and monitoring methodology listed in appendix B (of Annex II of 4/CMP.1) may be used for a small-scale CDM project activity if the project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more of the barriers listed in attachment A to appendix B. Where specified in appendix B for a project category, quantitative evidence that the project activity would otherwise not be implemented may be provided instead of a demonstration based on the barriers listed in attachment A to appendix B (4/CMP.1, Annex II, paragraph 28).

Attachment A to Appendix B sets out the following barriers:

- Investment barrier
- Access-to-finance barrier
- Technological barrier
- Barrier due to prevailing practice
- Other barriers

The CDM Executive Board developed non-binding best practice examples to demonstrate additionality for small-scale projects (EB 35, Annex 34) to aid the demonstration of additionality. Details provided are as follows:

- 1. Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions; best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency). It is recommended to use national or global accounting practices and standards for such an analysis.



2. **Access-to-finance barrier:** the project activity could not access appropriate capital without consideration of the CDM revenues;
Best practice examples include but are not limited to, the demonstration of limited access to capital in the absence of the CDM, such as a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.
3. **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
Best practice examples include but are not limited to, the demonstration of non-availability of human capacity to operate and maintain the technology, lack of infrastructure to utilize the technology, unavailability of the technology and high level of technology risk.
4. **Barrier due to prevailing practice:** prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
Best practice examples include but are not limited to, the demonstration that project is among the first of its kind in terms of technology, geography, sector, type of investment and investor, market etc.
5. **Other barriers** such as institutional barriers or limited information, managerial resources, organisational capacity, or capacity to absorb new technologies.

In the context of a PoA the requirement of additionality means that both the PoA itself and each CPA would not have been implemented, or would not have been implemented to the same extent, without registration under the CDM.

Additionality is demonstrated at the PoA level using barrier analysis as described above. The barrier used to demonstrate additionality is an investment barrier - a financially more viable alternative to the project activity would have led to higher emissions i.e. due to a lack of finance, the purchasing of kerosene continues instead of an investment in solar LED lamps.

An analysis of the investment barrier extends beyond the price point analysis as subsidized by the carbon financing realized by implementation of the project activity. The purchasing power of persons within the African Market should be analyzed against their willingness to purchase the solar lamps. In a 2005 analysis of the Gross National Income of countries based on Purchasing Power Parity (PPP) per capita in international Dollars the countries to be included in this PoA are very much on the lower end each with a very low GNI per year:

- Malawi* - 596
- Angola* - 2,829
- Mozambique* - 1,335
- Zimbabwe – 2,413
- Botswana – 10,866
- South Africa – 11,035
- Namibia – 6,658
- Zambia* - 911

(* denotes least developed country)



In a 2002 analysis of the countries with lowest human development by standards of the Human Development Index (HDI)¹⁴, the countries to be included in this PoA are very much on the lower end each with an extremely low HDI:

- Malawi* - 0.388
- Angola* - 0.381
- Mozambique* - 0.354
- Zimbabwe – 0.491
- Zambia* - 0.389

(* denotes least developed country)

This above is indicative of the widespread poverty levels witnessed across Africa. Lack of appropriate financing creates bottlenecks along the entire off-grid lighting market value chain. Most of these financing constraints are related to each other and stem from a lack of liquidity amongst both low-income consumers and the small and medium enterprises (SMEs) that comprise the majority of players in this market.

According to Lighting Africa¹⁵ the primary financing challenges for each step of the supply chain are highlighted below:

(1) Manufacturers: Producers face two financing challenges. The first lies in initial capital for both R&D and the fixed assets for a production facility. The second challenge lies in working capital - having sufficient liquidity to purchase raw materials and produce finished goods before receiving payment.

(2) Wholesalers and large distributors: As wholesale distribution is a relatively “capital light” operation, the biggest burden comes in working capital. The wholesalers (whether they are the product owners who have outsourced its manufacturing or country-wide master distributors) are hit hard in a number of ways:

- As small businesses, they are typically offered little credit from producers;
- They typically face disproportionately high inventory levels due to a long global supply chain or poor demand predictions in early years of operations; and
- They are often required to extend credit to dealers in order to stimulate sales.

(3) Small retailers: The last-mile dealers are similarly squeezed on working capital liquidity, as they are usually small rural/peri-urban operations and face the consumer’s limited ability to pay for goods or technologies.

(4) Customers: Affordability is clearly one of the leading barriers to the rapid adoption of off-grid lighting products in the developing world. Lower-income households typically cannot afford to pay a lump sum of \$10 or more. It has been proven that poor consumers are willing and able to pay for off-grid lighting products under an appropriately designed credit scheme. However, we have yet to see rapid adoption of these schemes, due to the small ticket size of the product, the lack of financing for these programs, and the challenges of risk-sharing and logistics coordination between financial institutions and product companies, to name a few obstacles.

¹⁴ Reference 14

¹⁵ Reference 15



Furthermore, in interviews provided in the Lighting Africa research, it is revealed additional or crosscutting themes present in the East African context:

- A limited understanding of the solar lighting industry by African banks and MFIs: A stronger emphasis must be placed on incorporating potential financial backers into industry-wide strategy going forward. Strong partnerships and relationships with lenders are an essential aspect to building trust and understanding in the market, enabling the loosening of finance markets.
- An inherent cautionary attitude to lending by banks: In part driven by a lack of market understanding among lenders, the solar lighting market must be able to demonstrate transparent market economics that demonstrate a fundamentally strong and high-potential industry.
- Available financing is often security-based, while most suppliers do not hold collateral
- High interest rates (up to 40% in certain countries): Prohibitively high interest rates negate the fundamental purpose of alternative financing plans, providing little to no incentive for their utilization

Furthermore there remains significant need for promotional and awareness campaigns given the lack of information on the use of Solar Lamps. These campaigns are often resource intensive because of the logistics, human resource and liquidity required for efficient management amongst a target group which is both diverse in cultural practice and belief and geographical location. Revenue realized from the proposed PoA will not only subsidize the price point per project lamp, it will also facilitate these campaigns and enable ToughStuff International staff to operate at feasible management and corporate costs.

The use of carbon finance to lower the price of the lamps and associated solar panels allows greater affordability and hence overcomes this investment barrier.

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

A.4.4.1. Operational and management plan:

>>

A record keeping system for each CPA under the PoA

The CME for the PoA shall be ToughStuff International Ltd. As CME, ToughStuff International will institute the following measures for its operational, management and monitoring plan:

- a. The CME will establish and maintain an extensive, electronic database of each CPA included in the PoA and these records will include the following:
 - i. Name and unique ID number of the CPA;
 - ii. LED Lighting System type and specifications;
 - iii. Distribution/Implementing partners and their contact details;
 - iv. Date of Registration of the CPA;
 - v. Unique Serial Number sequence for lamps sold under the CPA;
 - vi. Start date of the CPA;
 - vii. Start and end dates of each monitoring period;
 - viii. CERs issued per monitoring/verification period;



- ix. Total Number of lamps distributed.

The CME will be responsible for the management of records and data associated with each CPA and all records will be stored for a period of two years after the end of the crediting period. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

- b. Additionally the CPA implementing entity will also monitor and maintain a database relating to sales (Sales Database) for each CPA which will also be stored for at least two years after the end of the crediting period and will include the following:
- i. Name and unique ID number of the CPA;
 - ii. Name and details of Distributor/Retailer;
 - iii. Confirmation of the CER Transfer agreement to the CME;
 - iv. Unique ID/serial Number of each lamp/lantern sold;
 - v. LED Lighting System type and specification of each lamp/lantern sold;
 - vi. Date of sale of each lamp/lantern sold;
 - vii. Name, contact details and as much detail relating to physical addresses as possible of each recipient of a project lamp (end user).

A system/procedure to avoid double counting

Prior to registering a new CPA within the proposed PoA, the CME will check the CDM project database to establish whether a CDM project activity or CPA of another PoA has already been registered within the borders of the Countries with the same scope or objective. This search will cover registered project activities, project activities requesting registration, project activities under review and project activities for which either a review or corrections have been requested.

Furthermore, each CPA will be required to expressly state that it has not been registered as a single CDM project activity or as a CPA under another PoA. Each CPA will also be accorded a unique serial number. Each lamp/lantern will also have its own unique ID/serial number which will be used to identify each of the lamps sold under each particular CPA.

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

According to the “Guidelines on assessment of debundling for SSC project activities, v03 (EB 54, Annex 13, par.10) for determining the occurrence of debundling under a Programme of Activities (PoA)”, if each of the independent subsystem/measures included in the CPA of a PoA is not larger than 1% of the small scale threshold defined by the methodology applied, than that CPA of the PoA is exempted from performing de-bundling check, i.e. considered as not being a de-bundled component of a large scale activity.

As described in section A.4.4.1., a record of the total CERs issued per CPA will be maintained to ensure that none of the individual lamps sold under the CPA exceeds the 1% threshold. Default emissions reductions per independent measure (i.e. individual LED lamp) as defined in the indicative baseline and monitoring methodology AMS III.AR. v2.0 EB65 are 0.08tCO₂e per lamp, which is significantly below 1% of the small scale threshold.



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

As CME, Tough Stuff International will require written statements acknowledging that the CPA implementing entity subscribes to the PoA. As previously described each customer will be required to transfer all realized CERs to the CME.

Contractual relations will be established between the CME and each CPA implementing entity to ensure that all parties are aware of the PoA and acknowledgement that the CPA implementing entity subscribes to the PoA and transfers CERs to the CME. This agreement will be called a CPA CER Transfer Agreement.

Contractual relations will be established between each CPA implementing entity and each end user to ensure that each end user is aware of the PoA and CPA and that CERs will be transferred to the CME. This agreement will be called an End User CER Transfer Agreement.

A.4.4.2. Monitoring plan:

>>

Each CPA under this PoA will be subject to all parameters identified in Section E.7.1 and will be monitored according to the procedures & monitoring framework established in E.7.2 The CME will establish and maintain an extensive, electronic database of each CPA included in the PoA and will maintain records as described in section A.4.4.1.i Additionally the CPA implementing entity will also monitor and maintain a database relating to sales for each CPA (also described in A.4.4.1.i). The technical review of the inclusion of SSC-CPAs will occur via the eligibility criteria that each SSC-CPA must meet for inclusion in this PoA.

The monitoring plan implemented for this PoA applies the approved small scale monitoring methodology AMS III.AR. - Substituting fossil fuel based lighting with LED/CFL lighting systems v2.0 EB65.

A monitoring report will be provided by the CME to allow the DOE to verify the emission reductions for each monitoring period of each individual CPA. The use of unique identifiers and QA/QC procedures will ensure that double counting is not possible.

For monitoring and verification purposes, within the monitoring report, details will be provided on ToughStuff International (CME) conducting the following:

1. Confirm that each CPA's emission reductions are less than 60,000 tCO₂e annually as per the approved methodology. This will be achieved by monitoring total sales, emissions per lamp and CERs per CPA.
2. Ensure that each CPA maintains a Sales Database to which data is properly entered adequately described the names and contact details of the customers as well as the unique serial number attributed to each lamp.
3. Conduct random sampling measures for households under each CPA.
4. Confirm that household/customer names are not re-entered in the same CPA or entered into other CPAs under the PoA.
5. Confirm that the unique serial numbers are not repeated in the same CPA or entered into other CPAs under the PoA



Section E.7.2 (Description of a monitoring plan for a SSC-CPA) contains details of the sampling plan and methods to be used by each SSC-CPA.

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

>>

No public funding will be used for the activity.

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

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

>>

The start date of the PoA is the date of the start of Global Stakeholder Consultation

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

>>

28 Years

SECTION C. Environmental Analysis

>>

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

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

The PoA covers a variety of Host Countries which are diverse in both socio-economic conditions and cultural preferences. The environmental analysis will be held at SSC-CPA level to ensure that these dynamics are adequately represented.

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

>>

N/A

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):

>>



N/A

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

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

The PoA covers a variety of Host Countries which are diverse in both socio-economic conditions and cultural preferences. The local stakeholder analysis will be held at SSC-CPA level to ensure that these dynamics are adequately represented.

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

>>

N/A

D.3. Summary of the comments received:

>>

N/A

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

>>

N/A

SECTION E. Application of a baseline and monitoring methodology

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

>>

All SS-CPAs included in this PoA will subscribe to the approved baseline and monitoring methodology:



AMS III.AR. v02 EB65 -Substituting fossil fuel based lighting with LED/CFL lighting systems.

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

>>

The SS-CPAs included in this PoA comprise the implementation of LED based lighting lamps in residential/non-residential settings with the objective of displacing fossil fuel based lamps. AMS III.AR. v2.0 EB65 provides a baseline and monitoring methodology for projects that substitute fossil fuel based lighting with LED/CFL lighting systems.

AMS III.AR. v2.0 EB65 Applicability criteria	Justification
<p>This category comprises activities that replace portable fossil fuel based lamps (e.g. wick based kerosene lamps) with LED based lighting systems in residential and non-residential applications (e.g. ambient lights, task lights, portable lights).</p>	<p>All CPAs instituted under this PoA will be required to implement activities that place LED lighting systems in residential/non-residential settings that replace fossil fuel based lamps.</p>
<p>This methodology is applicable only to project lamps whose batteries are charged using one of the following options:</p> <p>(a) Charged by a renewable energy system included as part of the Project Lamp (e.g. a photovoltaic systems or mechanical systems such as a hand crank wind battery chargers);</p> <p>(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;</p> <p>(c) Charged by a grid that is connected to regional/national grid.</p>	<p>All the project lamps placed under this PoA will have rechargeable batteries charged by Solar PV Panels i.e. criterion (a).</p>
<p>At a minimum project lamps shall be certified by their manufacturer to have a rated average life of at least:</p> <ul style="list-style-type: none"> - 5,000 hours (if Option 1, paragraph 11 chosen in AMS III.AR. V2.0 EB65); - 10,000 hours (if Option 2, paragraph 12 chosen in AMS III.AR. v2.0 EB65). <p>Rated average life is the life certified by the manufacturer or responsible vendor as being the time at which the lamps initial light output will decline by no more than 30%. In addition, the manufacturer shall certify that the project lamp's battery charging circuit efficiency, at the time of purchase, is at least 50%.</p>	<p>This will be a compulsory requirement for all CPAs instituted under the PoA to provide manufacturer's certification proving minimum rated average life of 5,000 hours (if option 1 chosen) or 10,000 hours (if option 2 chosen). Further – that the battery charging circuit efficiency at the time of purchase is at least 50%.</p>
<p>Project Lamps shall have a warranty of a minimum</p>	<p>All project lamps included in the CPA shall accord the user a minimum one year warranty which will</p>



of one year warranty. At a minimum, the warranty shall cover free replacement or repair of any failed lamps, batteries and where applicable solar panels.	cover replacement/repair of failed lamps, batteries and solar panels.
Minimum performance characteristics and design specifications, which should be proven by third-party test results, shall be met or exceeded (supporting documentation made available).	CPA-DDs will incorporate and justify minimum performance characteristics and design specifications in line with the meth.
The project activity shall restrict the number of project lamps distributed through the project activity to no more than five per household or per business location (e.g. for commercial applications such as shops).	The Sales Database maintained by each CPA implementing entity will aid in monitoring this criterion.
Measures are limited to those that result in emissions reductions of less than or equal to 60 kt CO ₂ e annually.	Each CPA in the PoA shall be demonstrate how they are capped at a threshold of no more than 60 kt CO ₂ e annually.

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

>>

	Source	Gas	Included?	Justification
Baseline	Traditional Fuel based lighting systems	CO ₂	Yes	Main Source of emissions
		CH ₄	No	Excluded to maintain conservativeness
		N ₂ O	No	Excluded to maintain conservativeness
Project	LED Lighting System (Project Lamp)	CO ₂	No	No attributable emissions from project activity as project lamps are charged by a renewable energy system
		CH ₄	No	No attributable emissions from project activity as project lamps are charged by a renewable energy system
		N ₂ O	No	No attributable emissions from project activity as project lamps are charged by a renewable energy system

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

>>



The baseline scenario is the use of kerosene lighting applications for residential/non-residential lighting needs. This is in accordance with the baseline and monitoring methodology AMS III.AR. v2.0 EB65 which states “This category comprises activities that replace portable fossil fuel based lamps (e.g. wick-based kerosene lanterns) with battery-charged LED or CFL based lighting systems in residential and/or non-residential applications (e.g. ambient lights, task lights, portable lights)”.

To aid the demonstration of the baseline scenario being the use of kerosene lighting applications for residential/non-residential lighting needs, further details per country are provided.

As of 2009, grid connection rates across Africa stood at just 35%, with more than 111 million un-electrified households, covering over 580 million individuals based on our country-level database for the continent¹⁶

<u>Region</u>	<u>% On Grid</u>	<u>Millions of Household on grid</u>	<u>Millions of Household off- grid</u>
Central Africa	18	4	19
East Africa	15	9	50
North Africa	76	18	6
Southern Africa	70	7	3
West Africa	39	22	34
Africa Total	35	60	111

Table 3: Grid Connection in African Households¹⁷

South Africa:

It is estimated that about 40% of households in South Africa use paraffin (kerosene) as an energy carrier to meet some part of their domestic energy needs¹⁸. Paraffin is widely used primarily because of its relative affordability; convenience; versatility; ease of purchase, transportation and use; and availability. Further reasons include issues such as the decreasing availability of fuel wood in rural areas; increased urbanization; population growth; and wide availability from informal and flexible distribution networks¹⁹. Paraffin is an extremely useful fuel with a high calorific value, but it is being used in unsafe ways and in a system that is presently not as safe as other household energy systems such as electricity. The paraffin Safety Association of South Africa did a survey between 2007 and 2011 in which 7630 paraffin-using households were visited²⁰. According to the data, paraffin lamp users typically reside in zinc (69%) or brick (12%) housing, have 3.5 household members, and have a total monthly household income of R1,056. Electricity use is low (32%), and the average quantity of paraffin used weekly was 4.69 litres but has increased to 5.1 litres.

Malawi:

¹⁶ Reference 16

¹⁷ Reference 17

¹⁸ Reference 18

¹⁹ Reference 19

²⁰ Reference 20



Malawi is one of the world's least developed countries, ranking 168 out of 174 countries according to the Human Development Index of the United Nations Development Program²¹. In the absence of reliable grid electricity, households across the developing world depend on kerosene, candles, biomass, and other non-electric sources for their lighting needs. Adkins *et. al.* carried out a study/trial in Malawi whose purpose was to both accelerate adoption of improved lighting technologies as well as to develop the local institutions for a larger market-based approach that would be sustainable and ultimately self-financed²². The lighting survey was administered in 2008. The results portrayed an overwhelming dependence among households on fuel-based light sources, specifically kerosene and candles, as reported in the baseline energy survey - 96% of those surveyed stated using kerosene as their primary light source.

Angola:

Table 1 shows that the electrification rate in Angola is very low. As per 2007, although economic growth is strong, Angola remains one of the poorest countries on the African continent with agriculture sustaining two-thirds of Angola's population, who continue to live on \$1 per day²³. In 2002 Angola emerged from almost three decades of civil war that left much of its infrastructure destroyed or damaged and a large part of its population displaced. Largely as a consequence, Angola currently ranks low among African countries in many human development indicators²⁴. Furthermore, Increasing access to modern energy sources in a sustainable manner could help improve livelihoods directly, as well as indirectly through the promotion of economic development. Almost all isolated and backup electricity systems in the country run on diesel. There is also a large amount of self-generation taking place, also mainly diesel-fired. According to this document there is currently no rural electrification plan for rural Angola. Many rural (low and middle income) Angolans rely on biomass, kerosene, and candles for most of their energy needs,

Zambia:

More than 50 percent of the population in Zambia live in rural areas, often in isolated homesteads difficult and expensive to supply with centrally generated electricity. As stated previously (in A.1.) approximately 18% of the population has access to electricity²⁵. Only 2% of the rural population has access to electricity compared to 35% for urban areas. A majority of the respondents to the Lighting Africa study in Zambia (28%) are unemployed, 25% are farmers and the average Zambian household income is US \$150,90. This study provides details that of those that have access to electricity, a very large percentage (89%) of households experience power cuts as frequently as daily to once a week indicating that the electricity network in Zambia really is in quite poor order. 37% of consumers in the study state they would improve the lighting in their household as their main priority. 67% of consumers state their household is poorly lit of which 86% say to improve the situation they would need to add more lights. Kerosene, candles, firewood and charcoal are used in Zambian homes. Out of the list of lighting products presented to the consumer they prefer the 'solar powered lantern', this is likely to be due to the fact it is safe and clean and does not require re-fueling.

Mozambique:

²¹ Reference 21

²² Reference 22

²³ Reference 23

²⁴ Reference 24

²⁵ Reference 25



As stated previously (in A.1.) approximately 11% of the population has access to electricity. Biomass, micro-hydro, wind, solar and geothermal resources constitute some of the country’s renewable energy resources²⁶. Most of Mozambique’s primary energy consumption is met by traditional biofuels such as wood, charcoal and agro/animal wastes. In rural areas the majority of the population uses kerosene for lighting²⁷. The other energy source for lighting is mainly electricity and, as such, reflects the electrification pattern of the country, with Maputo City having by far the highest electricity consumption.

Zimbabwe:

Fuel wood is the most important domestic fuel in the country. It is the major source of energy for cooking, lighting and heating in rural and peri-urban areas. High income households dominate the grid and solar electrified categories²⁸. In Harare, 16% of urban households use firewood, 47% use paraffin^{29 30}. Paraffin is the main lighting fuel in poor urban households and rural households. Poor households do not have many alternatives for lighting and therefore will continue to use paraffin.

Botswana:

Botswana has a population of about 1.7 million, 80% of whom live in rural areas where paraffin use is prevalent³¹, for both lighting and cooking³². IN Botswana the government therefore ensures that the price of paraffin is affordable by the rural households by controlling retail prices. The table below shows typical paraffin consumption by income level and indicates that usage of paraffin is higher among all rural income groups. Of significance is the 83% of the lower income group households with income of less than P100/month showing the very high level of consumption, and that low income households are benefiting from the controlled price of paraffin.

Table 4: Paraffin Consumption by households: 2001

Income/month	% Households with Income	% Of Households with Income using Paraffin
Up to P100	17.13	83.0
P101-P150	28.46	90.1
P151-P250	14.99	94.3
P251-P500	18.01	89.1
>P500	21.41	80.3
Total Sample	100.0	

²⁶ Reference 26

²⁷Reference 27

²⁸ Reference 28

²⁹ Reference 29

³⁰ Reference 30

³¹ Reference 31

³² Reference 32



Namibia:

According to the Namibia central bureau of statistics there was a 100-fold increase in paraffin use between 1991 and 2001³³. In a 1998 energy policy white paper it is stated that the majority of rural households rely on biomass fuels, particularly wood fuel, to meet their energy needs³⁴. Further, paraffin is used predominantly for lighting, although a few rural households use it for cooking³⁵. The problem is insufficient electricity generation in the country compounded by the fact that the power grid is limited and excludes many poor urban communities and rural villages. This leaves thousands of Namibians without electricity, leaving them to rely on fuels like wood, paraffin, charcoal and propane³⁶.

Baseline emissions:

The baseline emissions are calculated using equation 3 as follows:

$$BE_y = DV \times GF_y \times DB_y \tag{3}$$

Where:

- BE_y* – Baseline emissions per project lamp in year y (tCO₂e)
- DV* – Lamp Emission Factor - calculated as per equation (2)
- GF_y* – Grid factor in year y, equal to 1.0 when charging option defined in paragraph 2(a) is used
- DB_y* – Dynamic Baseline Factor - change in baseline fuel, fuel use rate, and/or utilization during crediting period in year y. Calculated as either:
 Option 1: default of 1.0 in the absence of relevant information,
 Option 2: value of 1.0+FFg where FFg is the documented national growth rate of kerosene fuel use in lighting from the preceding years (use the most recent available data for a three or five year's average (fraction)³⁷.

The Lamp Emission Factor (*DV*) is calculated using equation 2 as follows:

$$DV = FUR \times O \times U \times EF/1000 \times LF \times n \times NTG \tag{2}$$

Where:

- DV* – Lamp Emission Factor - 0.08 tCO₂ per project lamp
- FUR* – Fuel Use Rate - 0.025 litres per hour
- O* – Utilization Rate - 3.5 hours per day
- U* – Annual Utilization - 365 days per year
- EF* – Fuel Emissions Factor - 2.4 kg CO₂ per litre

³³ Reference 33
³⁴ Reference 34
³⁵ Reference 35
³⁶ Reference 36
³⁷ Reference 37



<i>LF</i>	–	Leakage Factor	- 1.0
<i>n</i>	–	No. of fuel-based lamps replaced per project lamp	- 1.0
<i>NTG</i>	–	Net to Gross Adjustment Factor	- 1.0

Paragraph 15 of AMS III.AR. v2.0 EB65 states that:

Alternative values for parameters in equation 2 to result in a different value for *DV* paragraph 13 (e.g. Fuel use rate, utilization rate) can only be used if adequate research/monitoring and documentation is provided by the project proponent (e.g. strategic surveys and research conducted by national or local organizations, initiatives by international organizations or non-governmental organizations or the project proponent to collect reliable and comprehensive data).

Each CPA within this PoA will use the default values described above, unless the CPA can show within their CPA-DD that for that particular host nation there is adequate research/monitoring and documentation (e.g. strategic surveys and research conducted by national or local organizations, initiatives by international organizations or non-governmental organizations or the project proponent to collect reliable and comprehensive data) providing values that can be used in determining baseline emissions instead of the default values.

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 SSC-CPA): >>

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

>>

This PoA-DD provides details of an assessment of additionality at the PoA level in Section A.4.3. As the demonstration of additionality is done on a PoA level, a typical CPA included under the PoA is therefore deemed to be additional in itself upon review of its compliance with the eligibility criteria as described in this PoA-DD.

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

>>

This PoA-DD provides details of an assessment of additionality at the PoA level in Section A.4.3. As the demonstration of additionality is done on a PoA level, a typical CPA included under the PoA is therefore deemed to be additional in itself upon review of its compliance with the eligibility criteria as described in this PoA-DD.

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:

>>



Baseline Emissions:

The CPA implementing party may choose the default factors provided in the methodology AMS III.AR. v2.0 EB65:

<i>DV</i>	–	Lamp Emission Factor	– 0.08 tCO ₂ per project lamp
<i>FUR</i>	–	Fuel Use Rate	– 0.025 litres per hour
<i>O</i>	–	Utilization Rate	– 3.5 hours per day
<i>U</i>	–	Annual Utilization	– 365 days per year
<i>EF</i>	–	Fuel Emissions Factor	– 2.4 kg CO ₂ per litre
<i>LF</i>	–	Leakage Factor	– 1.0
<i>n</i>	–	No. of fuel-based lamps replaced per project lamp	– 1.0
<i>NTG</i>	–	Net to Gross Adjustment Factor	– 1.0

Alternative values for parameters identified above (e.g. Fuel use rate, utilization rate) can only be used in each CPA if adequate research/monitoring and documentation is provided by the project proponent e.g. strategic surveys and research conducted by national or local organizations, initiatives by international organizations or non-governmental organizations or the project proponent to collect reliable and comprehensive data.

Point 2 of AMS III.AR. v2.0 EB65 states that “This methodology is applicable only to project lamps whose batteries are charged using one of the following options:

- a) Charged by a renewable energy system included as part of the Project Lamp (e.g. a photovoltaic systems or mechanical systems such as a hand crank chargers);
- 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;
- c) Charged by a grid that is connected to regional/national grid.”

All CPAs in this PoA will distribute project lamps whose batteries are charged using a solar PV panel i.e. a renewable energy system included as part of the Project Lamp i.e. option A. Therefore GF_y = 1.0 for baseline emissions per equation 3: BE_y = DV x GF_y x DB_y.

The CPA implementing party may choose either option 1 – paragraph 11 or option 2 – paragraph 12 for the effective LED Lamp Effective Useful Life but must strictly adhere to the requirements established in paragraph 12 of the methodology if Option 2 is selected.

Third Party testing of the LED Lamps, Solar Panels and batteries will be made available to the CME at any time during the project activity.

Monitoring:

Monitoring options for this methodology includes:

- (i) Recording of project lamp distribution data;
- (ii) Where Option 2, paragraph 12 is chosen ex post monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service in year y.

The CME will be provided with project lamp distribution data upon request from the CPA implementing entity. Furthermore this will be subject to monitoring plan as defined in Section A.4.2.



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

>>

Baseline emissions:

$$DV = FUR \times O \times U \times EF/1000 \times LF \times n \times NTG \quad (2)$$

Where:

<i>DV</i>	–	Lamp Emission Factor	– 0.08 tCO ₂ per project lamp
<i>FUR</i>	–	Fuel Use Rate	– 0.025 litres per hour
<i>O</i>	–	Utilization Rate	– 3.5 hours per day
<i>U</i>	–	Annual Utilization	– 365 days per year
<i>EF</i>	–	Fuel Emissions Factor	– 2.4 kg CO ₂ per litre
<i>LF</i>	–	Leakage Factor	– 1.0
<i>n</i>	–	No. of fuel-based lamps replaced per project lamp	– 1.0
<i>NTG</i>	–	Net to Gross Adjustment Factor	– 1.0

Point 15 of AMS III.AR. v2.0 EB65 states that:

Alternative values for parameters in equation 2 to result in a different value for DV paragraph 13 (e.g. Fuel use rate, utilization rate) can only be used if adequate research/monitoring and documentation is provided by the project proponent (e.g. strategic surveys and research conducted by national or local organizations, initiatives by international organizations or non-governmental organizations or the project proponent to collect reliable and comprehensive data).

$$BEy = DV \times GFy \times DBy \quad (3)$$

Where:

<i>BEy</i>	–	Baseline emissions per project lamp in year y (tCO ₂ e)
<i>DV</i>	–	as per equation (2)
<i>GFy</i>	–	Grid factor in year y, equal to 1.0 when charging option defined in paragraph 2(a) is used
<i>DBy</i>	–	Dynamic Baseline Factor - change in baseline fuel, fuel use rate, and/or utilization during crediting period in year y. Calculated as either: Option 1: default of 1.0 in the absence of relevant information, Option 2: value of 1.0+FFg where FFg is the documented national growth rate of kerosene fuel use in lighting from the preceding years (use the most recent available data for a three or five year's average (fraction)) ³⁸ .

Project emissions:

Point 16 or AMS III.AR. v2.0 EB65 states:

There are no project emissions (PEy = 0) if the project lamp charging mechanism utilized is as defined in:

- Paragraph 2 (a); or

³⁸ Reference 38



- b) Paragraph 2 (b) if the mini grid or distributed generation system is entirely powered by renewable energy generation unit(s).

All CPAs in this PoA will distribute project lamps whose batteries are charged using a solar PV panel i.e. a renewable energy system included as part of the Project Lamp i.e. option A, hence PE_y = 0.

Emission Reductions:

$$ER_y = \sum_{i,j} N_{i,j} \times (BE_{y,i} - PE_{y,i,j}) \times (OF_{y,i,j}) \tag{5}$$

ER_y - Emission reductions in year y (tCO₂e)

N_{i,j} - Number of project lamps distributed to end users of type *i* with charging method *j*

OF_{y,i,j} - 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 equal to 100% for years 1, 2 and 3. Equal to value determined per paragraph 21, for years 4, 5, 6 and 7³⁹

The emission reductions shall be considered from the date of distribution of the project lamps to end users.

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

Data / Parameter:	FUR
Data unit:	(litres/hour)
Description:	Fuel Use Rate - quantity of fossil fuel used per hour
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65 or Value quantified based on baseline surveys or literature review of host country
Value applied:	Default Value of 0.025 or Value quantified based on baseline surveys or literature review of host country
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for Fuel Use Rate. However AMS III.AR. v2.0 EB65 has a provision in paragraph 15 that allows CPA implementing entities to use alternative values based on strategic surveys and research conducted by national or local organizations, initiatives by international organizations or non-governmental organizations or the project proponent to collect reliable and comprehensive data. All reports/ baseline survey results must be provided to the CME and DOE upon request for validation and verification purposes.
Any comment:	

³⁹ Reference 39



Data / Parameter:	O
Data unit:	Hours per day
Description:	Utilization Rate – Hours per day fossil fuel lamps are utilized for
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	Default Value of 3.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for Utilization Rate
Any comment:	

Data / Parameter:	U
Data unit:	Days per year
Description:	Annual Utilization - Number of days in calendar year in which the (baseline) fossil fuel lamps are used
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	Default Value of 365
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for Annual Utilization
Any comment:	

Data / Parameter:	EF
Data unit:	kgCO ₂ per litre
Description:	Fuel Emission Factor
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	Default Value of 2.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for Fuel Emission Factor
Any comment:	

Data / Parameter:	LF
Data unit:	Number
Description:	Leakage Factor
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65



Value applied:	Default value of 1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for Leakage Factor
Any comment:	

Data / Parameter:	N
Data unit:	Number
Description:	Number of fuel-based lamps replaced per project lamp
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	Default value of 1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for the Number of fuel-based lamps replaced per project lamp
Any comment:	

Data / Parameter:	NTG
Data unit:	Number
Description:	Net to Gross Adjustment Factor
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	Default value of 1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS III.AR. v2.0 EB65 provides a default value for the Net to Gross Adjustment Factor
Any comment:	

Data / Parameter:	DV
Data unit:	tCO ₂ e
Description:	Lamp Emission Factor
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65 or as calculated based on Fuel Use Rate derived from baseline surveys/literature review.
Value applied:	Default value of 0.08 or value derived from baseline surveys/literature review
Justification of the choice of data or description of measurement methods	AMS III.AR. v2.0 EB65 provides a default value for the Lamp Emission Factor or allows for the calculation of the Lamp Emission Factor using a calculated value for Fuel Use Rate derived from baseline surveys/literature review.



and procedures actually applied :	
Any comment:	

Data / Parameter:	GF_y
Data unit:	Fraction
Description:	Grid factor
Source of data used:	Default value provided as per AMS III.AR. v2.0 EB65
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AMS III.AR. v2.0 EB65, GF _y equal to 1.0 when charging option defined in paragraph 2(a) is used i.e. lamps are charged by a renewable energy source (solar Led lamps included in this PoA will be charged by solar PV panels, therefore satisfying this condition).
Any comment:	

Data / Parameter:	DB_y
Data unit:	Number
Description:	Dynamic Baseline Factor - change in baseline fuel, fuel use rate, and/or utilization during crediting period in year y.
Source of data used:	Default value as per AMS III.AR. v2.0 EB65 or instruction in AMS III.AR. v2.0 EB65 for calculation using documented national growth rate of fossil fuel use in lighting from the preceding years (use the most recent available data for a three or five year's average (fraction)).
Value applied:	1.0 Or 1 + (FFG) where FFG is the fraction derived from national kerosene use growth rate
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value or calculation as per AMS III.AR. v2.0 EB65. This parameter accounts for increased fuel use for lighting as it affects the baseline fuel consumption throughout the crediting period. Use national statistics on documented increase in kerosene consumption.
Any comment:	

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

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

Data / Parameter:	N_{i,j}
Data unit:	Number
Description:	Number of project lamps distributed to end users of type <i>i</i> with charging method <i>j</i>



Source of data to be used:	CPA implementing entity will monitor and maintain a database relating to sales (Sales Database) for each CPA. This sales database will contain amongst other information, the Unique ID/serial Number of each lamp/lantern sold and hence the number of project lamps distributed to end users of type <i>i</i> with charging method <i>j</i> .
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined within each CPA Sales Database.
Description of measurement methods and procedures to be applied:	CPA implementing entity will monitor and maintain a database relating to sales (Sales Database) for each CPA. It will include the following: <ul style="list-style-type: none"> i. Name and unique ID number of the CPA ii. Name and details of Distributor/Retailer iii. Confirmation of the CER Transfer agreement to the CME iv. Unique ID/serial Number of each lamp/lantern sold v. LED Lighting System type and specification of each lamp/lantern sold vi. Date of sale of each lamp/lantern sold vii. Name, contact details and as much detail relating to physical addresses as possible of each recipient of a project lamp (end user).
QA/QC procedures to be applied:	The sales database will be developed and maintained for verification and issuance purposes and kept for at least for 2 years after end of individual crediting periods.
Any comment:	

Data / Parameter:	OF_{v,i,j}
Data unit:	Percentage
Description:	Percentage of distributed lamps which are in service and operational in year <i>y</i> for each lamp type <i>i</i> and charging method <i>j</i> .
Source of data to be used:	<i>Ex post</i> monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service in year <i>y</i> .
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A percentage of the total sales based on the monitoring survey which will prove operational lamps within the third year of the crediting period.
Description of measurement methods and procedures to be applied:	Monitoring surveys will be conducted in year 3 of the crediting period of each CPA.
QA/QC procedures to be applied:	<ul style="list-style-type: none"> (a) 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; (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);



	<p>(c) The method to select respondents for interviews is random;</p> <p>(d) The survey is conducted by site visits;</p> <p>(e) Only persons over age 12 are interviewed;</p> <p>(f) The PDD must contain the design details of the survey.</p>
Any comment:	

Data / Parameter:	Sales Database Information
Data unit:	-
Description:	<p>CPA implementing entity will monitor and maintain a database relating to sales (Sales Database) for each CPA. It will include the following:</p> <ul style="list-style-type: none"> i. Name and unique ID number of the CPA ii. Name and details of Distributor/Retailer iii. Confirmation of the CER Transfer agreement to the CME iv. Unique ID/serial Number of each lamp/lantern sold v. LED Lighting System type and specification of each lamp/lantern sold vi. Date of sale of each lamp/lantern sold vii. Name, contact details and as much detail relating to physical addresses as possible of each recipient of a project lamp (end user).
Source of data to be used:	CPA Sales Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Information to be collected and maintained as described under ‘Description’ above.
Description of measurement methods and procedures to be applied:	CPA implementing entity will use sales records and collect, monitor and maintain a database relating to sales (Sales Database) for each CPA.
QA/QC procedures to be applied:	Sales Database Information will be cross checked with all sales records to ensure completeness and accuracy of database.
Any comment:	

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

>>

A record keeping system will be put in place for each CPA under the PoA. The CME will establish and maintain an extensive, electronic database of each CPA included in the PoA.

The CME will be responsible for the management of records and data associated with each CPA and all records will be stored for a period of two years after the end of the crediting period. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.



The CPA implementing entity will also monitor and maintain a database relating to sales (Sales Database) for each CPA which will also be stored for at least two years after the end of the crediting period and will include the following:

- i. Name and unique ID number of the CPA;
- ii. Name and details of Distributor/Retailer;
- iii. Confirmation of the CER Transfer agreement to the CME;
- iv. Unique ID/serial Number of each lamp/lantern sold;
- v. LED Lighting System type and specification of each lamp/lantern sold;
- vi. Date of sale of each lamp/lantern sold;
- vii. Name, contact details and as much detail relating to physical addresses as possible of each recipient of a project lamp (end user).

According to AMS III.AR. v2.0 EB65, monitoring includes: (i) Recording of project lamp distribution data; and (ii) Where Option 2, paragraph 12 is chosen *ex post* monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service in year *y*. The *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 and only project lamps with a unique project marking can be counted as operating and in service.

It is important to note that *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 then counted as operating.*

The following survey principles shall be followed for activities related to determining number of project lamps in service and operating under the project:

- (a) 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;
- (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;
- (d) The survey is conducted by site visits;
- (e) Only persons over age 12 are interviewed;
- (f) The PDD must contain the design details of the survey.

With reference to point (f) above, monitoring surveys shall seek to establish the following parameters:

1. Name, contact details and location of recipient of a project lamp (end user);
2. Unique Identification of the CPA;
3. Name and details of Distributor/Retailer;
4. Confirmation of the CER Transfer agreement to the CME (check-list (yes/no));
5. Date of sale of that particular LED lamp;
6. Date of survey;
7. Age of interviewee;
8. Unique Identification of the solar LED lamp;
9. Proper usage and maintenance of the project lamp (check-list (yes/no));
10. Number of lamps installed per household.



Sampling plan:

This sampling plan has been developed in accordance with the “General Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities” Version 01 EB 50⁴⁰.

Sampling Objective: The objective is to sample the Sales Database in order to obtain a random generated sample size of end users that can be surveyed in order to determine the percentage of distributed lamps which are in service and operational in year y for each lamp type i and charging method j .

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.

Field Measurement Objectives and Data to be collected: The monitoring surveys shall seek to establish the following parameters:

1. Name, contact details and location of recipient of a project lamp (end user).
2. Unique Identification of the CPA
3. Name and details of Distributor/Retailer
4. Confirmation of the CER Transfer agreement to the CME (check-list (yes/no))
5. Date of sale of that particular LED lamp
6. Date of survey
7. Age of interviewee
8. Unique Identification of the solar LED lamp
9. Proper usage and maintenance of the project lamp (check-list (yes/no))
10. Number of lamps installed per household
11. Refusal/non response to survey (check-list (yes/no))

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 and only project lamps with a unique project marking can be counted as operating and in service. The Simple Random Sample method has been selected.

Target Population and Sampling Frame: The target population is those end users found in the Sales Database. The sampling frame is those end users found in the Sales Database selected as the basis for monitoring surveys.

Sample Method: The Simple Random Sample method has been selected where:

- Each observation will be chosen randomly and entirely by chance from within the CPA sales database. This will guarantee an unbiased estimate of the true population mean given the fact that each observation has equal probability of being selected for the survey.
- The target population has relatively homogenous characteristics (rural, limited access to electricity) and therefore is better suited for the random sampling method.

⁴⁰ Reference 40



- The sampling will be conducted at CPA level within closer geographical boundaries which will hence diminish the costs associated with the random selection of households.
- Selecting the most effective information gathering method - CPA implementing entities will be required to conduct face to face interviews at each residential/non-residential setting.

Desired Precision/Expected Variance and Sample Size: 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.

Procedures for Administering Data Collection and Minimizing Non-Sampling Errors: Monitoring surveys will be done to determine percentage of project lamps distributed to end users that are operating and in service. These surveys will be done by personnel trained by the CME ToughStuff International. The surveys will take into account the potential for refusals and other sources of non-response. Once complete, surveys will be electronically captured and answers to survey questions audited internally for quality control purposes.

Implementation. The schedule for implementing the sampling effort is as follows - 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 and only project lamps with a unique project marking can be counted as operating and in service. These surveys will be done by personnel trained by the CME ToughStuff International. The surveys will take into account the potential for refusals and other sources of non-response. Prior to analysis by the CME, surveys will be internally audited for quality control purposes.

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

>>

The baseline study and monitoring methodology were completed on 15 December 2011 by:

Graham Paul	Henk Sa
EcoMetrix Africa	EcoMetrix Africa
Graham.paul@ecometrix.co.za	Henk.sa@ecometrix.co.za



Annex 1

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

Organization:	ToughStuff International Ltd
Street/P.O.Box:	75 Westminster Bridge Road
Building:	
City:	London
State/Region:	
Postfix/ZIP:	SE1 7HS
Country:	United Kingdom
Telephone:	+44 (0) 20 7261 0983
FAX:	
E-Mail:	Simon.glossop@toughstuffonline.com
URL:	
Represented by:	
Title:	Group carbon manager
Salutation:	Mr.
Last Name:	Glossop
Middle Name:	
First Name:	Simon
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+44 (0) 20 7261 0983
Personal E-Mail:	Simon.glossop@toughstuffonline.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION
