



Monitoring report form for CDM programme of activities
(Version 05.0)

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

MONITORING REPORT

Title of the PoA	Ethiopia Off-Grid Renewable Energy Program		
UNFCCC reference number of the PoA	10285		
Version numbers of the PoA-DD applicable to this monitoring report	12.0		
Version number of this monitoring report	1.0		
Completion date of this monitoring report	01/12/2021		
Monitoring period number	2		
Duration of this monitoring period	01/11/2017 to 31/12/2020 (inclusive of both days)		
Monitoring report number for this monitoring period	1		
Coordinating/managing entity	Development Bank of Ethiopia		
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)	
	Federal Democratic Republic of Ethiopia	Yes	
Applied methodologies and standardized baselines	1: Energy industries (renewable - / non-renewable sources)		
Sectoral scopes	AMS-III.AR. Version 5 - Substituting fossil fuel based lighting with LED/CFL lighting systems AMS-I.F. Version 3 - Renewable electricity generation for captive use and mini-grid AMS-I.L. Version 3 - Electrification of rural communities using renewable energy AMS-I.B. Version 12 - Mechanical energy for the user with or without electrical energy Applied Standardized Baseline: Not Applicable		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31	Amount achieved from 1 January 2021

monitoring report in this monitoring period		December 2020	
	0 tCO ₂ e	77,693 tCO ₂ e	0 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	126,427 tCO ₂ e		

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

The Ethiopia Off-Grid Renewable Energy Program (the PoA) is a nation-wide program for Ethiopia that targets the large segment of the population without access to electricity for basic uses. Due to poor grid coverage and the dispersed nature of settlements in rural areas, only 14% of the population are connected to the electricity grid¹. Meanwhile, more than 12 million rural households rely on sources other than the electricity grid for energy for lighting, with the majority utilizing kerosene lamps.² This PoA promotes scaling-up of the uptake of off-grid renewable energy technologies to provide electricity for lighting and other domestic, commercial, or institutional energy needs for households and other users either not connected to the grid, or not served by the grid due to acute shortage of electricity in the grid.

The Government of Ethiopia (GoE) is pursuing dramatic expansion of electricity generation and grid connection;³ however, even with tremendous investments to rapidly scale up grid connection in Ethiopia, millions of families will still be living without electricity by 2025, leaving a significant market niche that the PoA could contribute to address. Conscious of this reality, the PoA will promote goals related to off-grid energy access of the GoE's Electricity Network Reinforcement and Expansion Project (ENREP), which includes targets of 150,000 solar household solar PV systems, 3,000 institutional solar PV systems and 3,000,000 small solar lighting systems (lamps/lanterns).¹The GoE wishes to achieve this through the use of market-based instruments such as carbon finance, which will be available through this PoA.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
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¹World Bank. *Project Appraisal Document for Electricity Network Reinforcement and Expansion Project (ENREP)*. Page 9. 29 May 2012.

²Central Statistical Agency, Federal Democratic Republic of Ethiopia. *Welfare Monitoring Survey 2011, Statistical Report: Indicators on Living Standard, Accessibility and Households Assets, Volume II*. Table 8.4 (b). April 2012.

³Ministry of Finance and Economic Development (Ethiopia). *Growth and Transformation Plan 2010/11 – 2014/15*. Page 72. November 2010.

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
<p>Title: DBE Off-grid renewable energy solar lamps CPA</p> <p>Reference Number: 10285-P1-000X-CP1</p>	12.0	1	<p>AMS-III.AR Substituting fossil fuel based lighting with LED/CFL lighting systems (Version 5.0)⁴</p> <p>AMS-I.D Grid connected renewable electricity generation Version (18.0)⁵</p> <p>AMS-I.F Renewable electricity generation for captive use and min-gird Version (3.0)⁶</p> <p>General guidelines for SSC CDM methodologies Version (22.1)⁷</p> <p>Guidelines on the demonstration of additionality of small-scale project activities Version (9.0)⁸</p> <p>Standard: Sampling and surveys for CDM project activities and programmes of activities Version (7.0)⁹</p> <p>Guideline: Sampling and surveys for CDM project activities and programmes of activities Version (4.0)¹⁰</p>

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

⁵ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

⁶ <https://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

⁷ <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

⁸ https://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

⁹ <https://cdm.unfccc.int/Reference/Standards/index.html>

¹⁰ <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
<p>Title: DBE Off-grid renewable energy captive use mini-hydro power CPA</p> <p>Reference Number: 10285-P1-000X-CP2</p>	12.0	1	<p>AMS-I.F. Renewable electricity generation for captive use and mini-grid (Version 3)¹¹</p> <p>Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 2.0)¹²</p> <p>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 2.0)¹³</p> <p>Tool to calculate the emission factor for an electricity system (Version 5.0)¹⁴</p> <p>Project emissions from cultivation of biomass (Version 1.0)¹⁵</p>
<p>Title: DBE Off-grid renewable energy solar PV CPA</p> <p>Reference Number: 10285-P1-000X-CP3</p>	12.0	1	<p>AMS-I.L Electrification of Rural Communities Using Renewable Energy (Version 3)¹⁶</p> <p>AMS-I.D Grid connected renewable electricity generation (Version 18.0)¹⁷</p> <p>AMS-I.F Renewable electricity generation for captive use and mini-grid Version (3.0)¹⁸</p> <p>General guidelines for SSC CDM methodologies Version (22.1)¹⁹</p> <p>Guidelines on the demonstration of additionality of small-scale project activities (Version 9.0)²⁰</p> <p>General guidance on leakage in biomass project activities (attachment C to Appendix B) (Version 3.0)²¹</p>

¹¹ <https://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

¹² https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view

¹³ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view

¹⁴ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf/history_view

¹⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-16-v1.pdf>

¹⁶ <https://cdm.unfccc.int/methodologies/DB/CCZKY3FSL1T28BNEGDRSCKS0CY0WVA>

¹⁷ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQOQFQQH4SBK>

¹⁸ <https://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

¹⁹ <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

²⁰ https://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

²¹ https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid04.pdf

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
<p>Title: DBE Off-grid renewable energy rural mini-hydro power CPA</p> <p>Reference Number: 10285-P1-000X-CP4</p>	12.0	1	<p>AMS-I.L. Electrification of rural communities using renewable energy (Version 3.0)²²</p> <p>AMS-I.D Grid connected renewable electricity generation Version (18.0)²³</p> <p>AMS-I.F Renewable electricity generation for captive use and min-gird (Version 3.0)²⁴</p> <p>General guidelines for SSC CDM methodologies (Version 22.1)²⁵</p> <p>Guidelines on the demonstration of additionality of small-scale project activities (Version 9.0)²⁶</p> <p>General guidance on leakage in biomass project activities (attachment C to Appendix B)(Version 3.0)²⁷</p>

A.1.2. CPAs included in the PoA

Title and UNFCCC reference number of the CPA	Version of the PoA-DD	Title and reference number of the corresponding generic CPA	Crediting period type and duration	Covered in this monitoring report? (yes/no)
<p>Title: DBE Off-grid renewable energy solar lamps CPA 1</p> <p>Reference Number: 10285-P1-0001-CP1</p>	12.0	<p>Title: DBE Off-grid renewable energy solar lamps CPA</p> <p>CPA Type: CPA Type 1</p>	<p>Type: Renewable</p> <p>Duration: 01/08/2016 to 31/07/2023</p>	Yes
<p>Title: DBE Off-grid renewable energy solar home system CPA 1</p> <p>Reference Number: 10285-P1-0002-CP1</p>	12.0	<p>Title: DBE Off-grid renewable energy solar PV CPA</p> <p>CPA Type: CPA Type 3</p>	<p>Type: Renewable</p> <p>Duration: 30/11/2017 to 29/11/2024</p>	No
<p>Title: DBE Off-grid renewable energy solar lamps CPA 2</p> <p>Reference Number: 10285-P1-0003-CP1</p>	12.0	<p>Title: DBE Off-grid renewable energy solar lamps CPA</p> <p>CPA Type: CPA Type 1</p>	<p>Type: Fixed</p> <p>Duration: 01/02/2018 to 31/01/2025</p>	Yes

²² <https://cdm.unfccc.int/methodologies/DB/CCZKY3FSL1T28BNEGDRSCKS0CY0WVA>

²³ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

²⁴ <https://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

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

²⁶ https://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

²⁷ https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid04.pdf

A.2. Coordinating/managing entity

The CME is the Development Bank of Ethiopia (DBE). DBE is a state owned financial institution. The DBE is headquartered in Addis Ababa, with further staff in the branches and regions of Ethiopia. The address of the DBE is the following:

Development Bank of Ethiopia
Kirkos
Addis Ababa
Ethiopia

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

The Development Bank of Ethiopia, the CME, has worked to implement the PoA as per the management system in the PoA-DD. At the time of monitoring, three CPAs have been included under the PoA. Two Type 1 CPAs, covering solar lamps and one type 3 CPA covering solar PV systems. This monitoring report covers only the first solar lamp CPA included at the time of registration. The PoA was registered on 01/07/2016.

The PoA supports the implementation of four different off-grid renewable energy technologies, including (1) solar lamps, (2) solar PV systems, (3) mini-hydroelectricity plants and (4) solar pumps for irrigation.

(1) Solar Lamps

These comprise zero-emissions off-grid lighting products or systems that are stand-alone, rechargeable and can be installed and operated by their user. Each unit has a retail price typically less than US\$100 and includes three main components: usually, a 1 to 5 W solar panel as the electricity source, a rechargeable battery, and a lantern or lamp, usually with an LED bulb. The solar panel is placed in the sun during the day to generate electricity that recharges the battery, and at night the electricity is available to power the lamp.²⁸ These units will provide lighting for individual households and may also provide cell-phone charging or similar. Only units that comply with the Lighting Global Minimum Quality Standards²⁹ and have a minimum warranty period of one (1) year will be eligible to be included in the program. Prior to the project, off-grid households relied on kerosene lamps for lighting, most of which are relatively inefficient tin lamps with a simple wick and no cover.³⁰ Burning of kerosene generates CO₂.

(2) Solar PV Systems

Solar PV Systems provide zero-emissions electricity supply to homes, institutions, or SMEs for a variety of uses, such as lighting, television sets and other small appliances. Each system will consist of at least a PV module to convert solar energy into electrical energy, a battery to store the electrical energy, a charge controller to protect the system from attaining an overcharged and undercharged condition, and cables and connecting devices. System capacities are expected to range between approximately 20 W to 150 kW. Only units that have a warranty period of five (5)

²⁸ World Bank. *Lighting Africa - Lighting Africa*. Accessed at <http://www.lightingafrica.org/> Accessed on January 2014.

²⁹ Lighting Global (IFC/ World Bank). *Lighting Global Minimum Quality Standards, Version 4.0*. January 2014.

³⁰ World Bank. *The Off-Grid Lighting Market in Sub-Saharan Africa: Market Research Synthesis Report. Lighting Africa*. February 2011.

years will be eligible to be included in the program. Prior to the project, off-grid households, institutions, or SMEs relied on kerosene lamps for lighting, most of which are relatively inefficient tin lamps with a simple wick and no cover.⁶In the baseline, off-grid lighting would have been provided by kerosene while batteries or diesel generators would have charged small appliances. Burning of kerosene and diesel generates CO₂.

(3) Mini-Hydroelectric Plants

These plants use hydroelectric technology to provide zero-emissions electricity for users such as off-grid communities, mini-grids, and so forth. Typical installations are expected to have a capacity less than or equal to 5 MW, although units up to 15 MW will be eligible. Prior to the project, off-grid users relied on kerosene lamps for lighting and diesel or other fossil fuel generators for general electricity needs. Hence the plants will replace kerosene lamps and generation from diesel generators or other existing fossil fuel fired units that generate CO₂.

(4) Solar Pumps for Irrigation

These solar powered water pumps provide access to groundwater supply for individual farmers or groups of farmers to enhance farming productivity and predictability. The units will be targeted to farmers in drought-prone regions, for example Somali and Afar states. Each individual unit is expected to include at a minimum solar PV panels, a motor, and a pump, with a pumping capacity of an estimated 15 – 50 L/sec, subject to change depending upon the specific requirements of each system's user(s). Each solar pump will offset a diesel-fired pump with similar capacity that would have generated CO₂ emissions in the baseline.

The inclusion of CPAs was conducted as per the table in the PoA-DD covering the various responsibilities for CPA inclusion. In the case of the included CPAs, the CME is also the CPA Implementer, so everything from development of the documentation through review of the documents and submission for inclusion was handled by the CME.

The CME also underwent training on the CDM, CPA inclusion, monitoring, verification, and issuance. The training was conducted over 2 days starting on 15/06/2017. The training was conducted by Ci-Dev and Climate Focus.

The figure below shows the entities involved and the relationships between those entities for CPA types 1 and 3, the only CPA types included under the PoA at the time of monitoring.

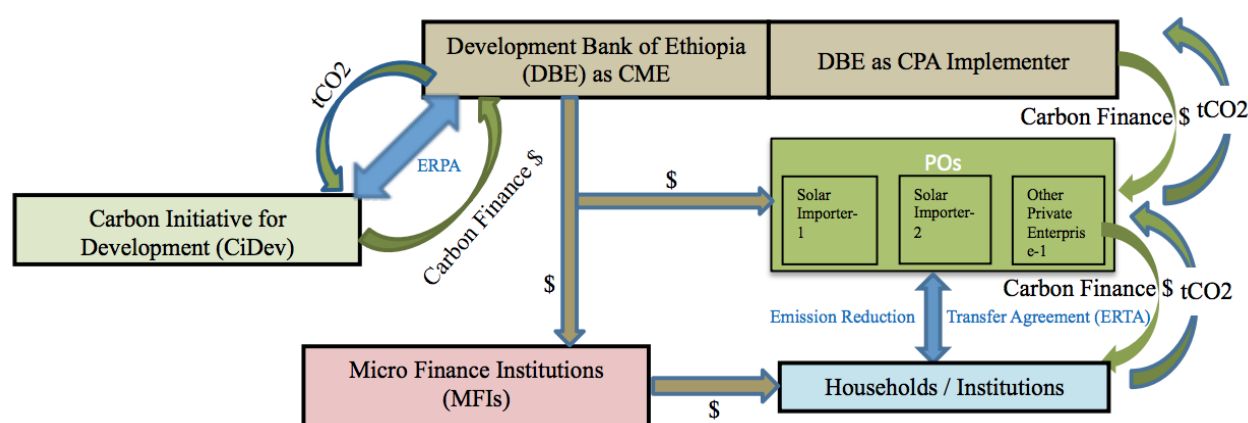


Figure 1. Overview of Management System for solar lamp and solar PV system CPAs

As per the diagram, the CME acted as the CPA Implementer and worked with private operators (POs) and microfinance institutions (MFIs) to disseminate solar technologies to households and institutions in Ethiopia.

The CPA covers efficient lamps that are solar powered and Lighting Africa certified. All lamps adhere to the minimum requirements of the methodology. The exact models and brand of lamps is provided for each specific CPA.

For the CPA included in this monitoring report a sampling approach was not undertaken as it can be assumed, as per methodology AMS-III.AR Version 5, that lamps are 100% functional during their two years of operation. Under DBE Off-grid renewable energy solar lamps CPAs 1 and 2, Lighting Africa certified solar lamps were sold or distributed to end-users.

B.2. Post-registration changes to PoA

B.2.1. Corrections

The following PRC was completed prior to this monitoring period:

Reference Number: PRC-10285-001

Date of Approval: 02/10/2018

Corrections covered under the PRC are the following:

Revisions have been made to various sections of the design document as the document was updated to the latest template. From Version 4.0 to Version 8.1.

The time period covered by a generic Type 1 CPA was updated from 2 years to approximately 3 years.

There are no other corrections to the PoA.

B.2.2. Inclusion of monitoring plan

There was a post-registration change to include the monitoring plan into the PoA-DD. The monitoring plan has been approved prior to submission of this monitoring report under the following PRC:

Reference Number: PRC-10285-001

Date of Approval: 02/10/2018

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

There are no permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baseline, or other applies standards or tools.

B.2.4. Changes to programme design

The following PRC was completed prior to this verification:

Reference Number: PRC-10285-001

Date of Approval: 02/10/2018

Changes to the programme design covered under the PRC are the following:

For generic CPA Type 1, the use of Option 1 or Option 2 under paragraphs 17 and 18 of AMS-III.AR Version 5.0 has been added to the generic CPA.

The eligibility criteria for CPA Type 1 have been revised to reflect the use of Option 1 or Option 2 under paragraph 17 and 18 of AMS-III.AR Version 5.0. Specifically, eligibility criterion 2, double counting, and eligibility criterion 12, methodology applicability/technology, were revised to reflect the use of Option 1 or Option 2 in the CPA.

B.2.5. Changes specific to afforestation or reforestation activities

This is not applicable to PoA covered in this monitoring report.

PART II Monitoring of CPAs

Title: DBE Off-grid renewable energy solar lamps CPA 1

Reference Number: 10285-P1-0001-CP1

And

Title: DBE Off-grid renewable energy solar lamps CPA 2

Reference Number: 10285-P1-0003-CP1

The two CPAs above have been grouped for the monitoring report as they cover the same technology, regions, and have identical ex-ante and ex-post parameters.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

The CPAs target poor and vulnerable households mainly in rural areas³¹, who rely primarily on fossil fuels for lighting, and provides improved energy access to such households, with associated benefits for poverty alleviation, while simultaneously reducing greenhouse gas emissions from the exploitation of fossil fuels. The CPAs includes the distribution of solar lamps/solar lanterns (referred to collectively as “solar lamps”) that provide lighting powered by solar energy, for households or other end-users in the entirety of Ethiopia. It was expected that the CPAs will include the following number of lamps:

CPA 1: Approximately 240,000 solar lamps to be distributed in Ethiopia between 20/01/2015 – 19/01/2018.

CPA 2: Approximately 454,344 solar lamps to be distributed in Ethiopia between 20/01/2017 – 19/01/2019.

The first solar lamp under the CPAs was sold on 21/01/2015.³² In actuality, the CPAs have distributed 657,270 (435,106 under CPA 1 and 365,177 under CPA 2) systems. All lamps are solar

³¹ Urban and peri-urban households may also benefit from the activity

³² Evidence of Start Date of Off-Grid CPA.png

powered and certified by Lighting Africa. The lamp models distributed under the CPAs are the following:

Table 1. List of Lighting Africa Certified Solar Lamp Technologies under the CPA

Manufacturer	Model	CPA 1	CPA 2
S2	d.Light Limited	149,091	-
S20	d.Light Limited	31,519	14,248
S300	d.Light Limited	33,637	-
D20	d.Light Limited	8,520	-
D34	d.Light Limited		4,994
D30	d.Light Limited		2,994
S500	d.Light Limited		8,624
D335	d.Light Limited		10,679
S3	d.Light Limited		231,514
Sun King Eco	Greenlight Planet	116,434	-
Sun King Mobile	Greenlight Planet	5,754	-
Sun King Pro 2	Greenlight Planet	37,129	2,880
Sun King Solo	Greenlight Planet	1,894	-
Sun King Boom	Greenlight Planet	-	1,245
Sun King Pico Plus	Greenlight Planet	-	20,488
Sun King Home 60	Greenlight Planet	-	10,623
Sun King Home 120	Greenlight Planet	-	7,271
Sun King Pro 200	Greenlight Planet	-	-
Sun King Pro 400	Greenlight Planet	-	8,636
Sun King Home 40Z	Greenlight Planet		3,643
MB2-090	Omnivoltaic Power	393	-
MB2-200	Omnivoltaic Power	25,347	-
MB2-290	Omnivoltaic Power	11,856	28
MB2-380	Omnivoltaic Power	11,622	463
ovPilot X	Omnivoltaic Power	1,910	162
Little Sun	Little Sun	-	26,615
Off Grid Station Plus	OffGridSun		8,541
Lumn M400	Omnivoltaic Power		939
RNT022	Renewit		464
WOWsolar 100	Amped Innovation PBC		126
Total		435,106	365,177

The volumes of lamp models by retailers are also shown in the emission reduction calculations.³³ For technical specifications for each technology covered by the CPA are provided below.

d.Light S300

Design Aspect	Requirement	Technology Performance³⁴
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	100 lumens (high setting) and 29 lumens (low setting) Wattage is up to 3.3 Watts on high setting ³⁵
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 100% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 1.6 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery is a lithium iron phosphate battery
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.1 hours at the high brightness setting and autonomous time is 5 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light D20

³³ Emission Reduction Calculation for Monitoring Report_V3.xlsx

³⁴ Lighting Global.D.Light S300 Technical Specifications. Accessed on October 10th 2015 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG-SSS_dl-s3004.pdf

³⁵ Assuming 30-90 lm/W for LED bulbs as per *Rapid Tables: How to convert lumens to watts* accessed at <http://www.rapidtables.com/calc/light/how-lumen-to-watt.htm>

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ³⁶
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	170 lumens (high setting), 56 lumens (low setting), and 25 lumens with the lantern at high setting Wattage is up to 5.7 Watts on high setting ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 98% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 5.4 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.1 hours at the high brightness setting and autonomous time is 5 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light S20

³⁶ Lighting Global.D.Light D20 Technical Specifications. Accessed on October 10th 2015 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG-SSS_dl-d20.pdf

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ³⁷
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	29 lumens Wattage is up to 1.0 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 103% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.4 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.5 hours. Autonomous burn time is 6.5 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light S2

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ³⁸
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum	33 lumens Wattage is up to 1.1 Watts

³⁷ Lighting Global.D.Light S20 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG_SSS-dl-S20_AR.pdf

³⁸ Lighting Global.D.Light S2 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2013/12/d.Light_S2_ar-corrected-170627.pdf

	wattage requirement	
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 97% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.33 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 3.9hours. ³⁹ Autonomous burn time is 5.3 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light D34

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁴⁰</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	430 lumens
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of	Option 2 is chosen. 102% of the original output remains after 2,000 hours of run time

³⁹Despite being below the minimum 4 hours of DBT, the product is certified to meet the Lighting Global Minimum Quality Standards

⁴⁰ Lighting Global.D.Light D34 Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2017/03/LG-SSS_dl-D34-v5-2radios.pdf

	long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 9 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 6 hours. Autonomous burn time is 6 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light D30

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁴¹</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	120 lumens per lamp
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 94% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 9 watt polycrystalline silicon module

⁴¹Lighting Global.D.Light D30 Family Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2016/06/LG-SSS_dl-D30-AR-v2.pdf

Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 6 hours. Autonomous burn time is 6 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light S500

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁴²</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	130 lumens Wattage is up to 2.5 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 102% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 2.5 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller

⁴²Lighting Global.D.Light S2 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2018/05/LG-SSS_S500-v5.pdf

Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 7.6 hours. Autonomous burn time is 8 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light D335

Design Aspect	Requirement	Technology Performance⁴³
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	120 lumens per lamp (D30 lamp)
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 94% of the original output remains after 2,000 hours of run time ⁴⁴
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 9 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 6 hours. Autonomous burn time is 6 hours.
Solar Run Times(s) (SRT) for products with solar	3.5 hours	The solar run time is 4.1 hours

⁴³Lighting Global.D.Light D33X Family Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2017/06/Spec_Book_d33Xfamily-v3.pdf

⁴⁴Lighting Global.D.Light D30 Family Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2016/06/LG-SSS_dl-D30-AR-v2.pdf

energy charging systems		
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

d.Light S3

Design Aspect	Requirement	Technology Performance⁴⁵
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	35 lumens Wattage is up to 0.33 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 99% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.33 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate based chemistry
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4 hours. Autonomous burn time is 4 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical

⁴⁵ Lighting Global.D.Light S3 Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2017/01/LG-SSS_dl-s3-AR-v2.pdf

		ingress protection test
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Sun King Pro 2

Design Aspect	Requirement	Technology Performance⁴⁶
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	160 lumens Wattage is up to 5.3 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 96% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 3 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 5.5 hours and the autonomous time is 5.9 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Eco

⁴⁶Lighting Global.Sun King Pro 2 Technical Specifications. Accessed on February 5th 2018 at https://www.lightingglobal.org/wp-content/uploads/2014/02/LG-SSS_glp_sunkingpro2_AR-1.pdf

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁴⁷</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	32 lumens Wattage is up to 1 Watt ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 101% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.73 watt amorphous silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 5.8 hours and the autonomous time is 5.8 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Mobile

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁴⁸</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	98 lumens Wattage is up to 3.2 Watts ¹³

⁴⁷ Lighting Global.Sun King Eco Technical Specifications. Accessed on February 5th 2018 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG-SSS_GreenlightPlanet_SunKingEco_AR.pdf

⁴⁸ Lighting Global.Sun King Mobile Technical Specifications. Accessed on October 10th 2015 at https://www.lightingglobal.org/wp-content/uploads/2014/02/LG-SSS_glp-sunkingmobile.pdf

Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 96% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 1.6 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 5.4 hours and the autonomous time is 5.4 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Solo

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁴⁹
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	51 lumens Wattage is up to 1.7 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the	Option 2 is chosen. 94% of the original output remains after 2,000 hours of run time

⁴⁹ Lighting Global.Sun King Solo Technical Specifications. Accessed on October 10th 2015 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG-SSS_glp-sunkingsolo_v3.pdf

	relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.78 watt amorphous silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 5.4 hours and the autonomous time is 5.8 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Boom

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁰
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	170 lumens Wattage is up to 1.2 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours (Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 100% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy	PV module No separate minimum rated	PV module is a 2.6 watt polycrystalline silicon module

⁵⁰Lighting Global.Sun King Boom Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2017/02/LG-SSS_glp-skboom-V2.pdf

equipment used for battery-charging (in Watts)	capacity requirement for PV module	
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 6.6 hours and the autonomous time is 6.6 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Pico Plus

Design Aspect	Requirement	Technology Performance⁵¹
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	47 lumens Wattage is up to 0.39 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 100% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.39 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate

⁵¹Lighting Global.Sun King Pico Plus Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2018/01/LG_SSS_glp-skpicoplus-v2-1.pdf

Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 3.8 hours and the autonomous time is 5 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Home 60

Design Aspect	Requirement	Technology Performance⁵²
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	67 lumens Wattage is up to 6.3 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 99% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 6.3 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 23 hours and the autonomous time is 27 hours

⁵²Lighting Global. Sun King Home 60 Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2015/10/LG-SSS_glp-skhome-AR-v2.pdf

Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Home 120

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁵³</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	140 lumens Wattage is up to 12 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours (Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 94% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 12 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 21 hours and the autonomous time is 26 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a	Not applicable	-

⁵³Lighting Global.Sun King Home 120 Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2016/04/LG-SSS_glp-skhome120-AR.pdf

centralized charging system (e.g. the national grid)		
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Sun King Pro 400

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁴
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	180 lumens Wattage is up to 5.2 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 100% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 5.2 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 13 hours and the autonomous time is 14 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

⁵⁴Lighting Global.Sun King Pro 400 Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2018/01/LG-SSS_glp-skp400-v6.pdf

Sun King Home 40Z

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u>⁵⁵
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	190 lumens (Overhead) 45 lumens (Portable) Wattage is up to 4 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 100% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 4 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) and the autonomous time is greater than 4 hours.
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is at least 4.7 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Omnivoltaic Beacon MB2-090

⁵⁵Lighting Global.Sun King Home 40Z Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2017/12/LG-SSS_SunKingHome40Z-v2.pdf

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁶
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	92 lumens Wattage is up to 3.1 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 93% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 1.3 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 5.1 hours and the autonomous time is 5.7 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Omnivoltaic Beacon MB2-200

⁵⁶ Lighting Global.Omnivoltaic Beacon MB2-090 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG_SSS-Omnivoltaic_MB2-090_v6.pdf

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁷
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	210 lumens Wattage is up to 7 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 93% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 2.6 watt amorphous silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.4 hours and the autonomous time is 5.3 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Omnivoltaic Beacon MB2-290

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁸
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⁵⁷ Lighting Global. Omnivoltaic Beacon MB2-200 Technical Specifications. Accessed on October 10th 2015 at https://www.lightingglobal.org/wp-content/uploads/2014/01/LG-SSS_mar-mb22001.pdf

⁵⁸ Lighting Global. Omnivoltaic Beacon MB2-290 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2014/01/LG-SSS_mar-mb2290_ar-HYBRID-v2-2.pdf

Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	210 lumens Wattage is up to 3.9 Watts ⁵³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 93% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 3.9 watt apolycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.2 hours and the autonomous time is 5.3 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Omnivoltaic Beacon MB2-380

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁵⁹
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	210 lumens Wattage is up to 7 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall	Option 2 is chosen. 93% of the original output remains after 2,000 hours of run time

⁵⁹ Lighting Global.Omnivoltaic Beacon MB2-380 Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2014/01/LG-SSS_mar-mb2380_ar-HYBRID-v2-1.pdf

	not decrease by more than 15% during 2,000 hours of continuous operation.	
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 3.9 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.3 hours and the autonomous time is 5.3 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

OmnivoltaicOVPIlot X

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁶⁰</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	74 lumens Wattage is up to 2.5 Watts ¹³
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 98% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy	PV module No separate minimum rated	PV module is a 2 watt polycrystalline silicon module

⁶⁰Lighting Global.OmnivoltaicovPIlot X Technical Specifications. Accessed on December 4th 2017 at https://www.lightingglobal.org/wp-content/uploads/2016/10/LG_SSS_omni-ovpilotX_AR-v2.pdf

equipment used for battery-charging (in Watts)	capacity requirement for PV module	
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium ion
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 8.9 hours and the autonomous time is 12 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Little Sun

Design Aspect	Requirement	Technology Performance⁶¹
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	29 lumens Wattage is up to 0.58 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. 87% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 0.58 watt monocrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate

⁶¹Lighting Global. Little Sun Technical Specifications. Accessed on February 14th 2020 at https://www.lightingglobal.org/wp-content/uploads/2013/12/LG-SSS_Is-littlesun-AR-v2-181002.pdf

Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) is 4.7 hours and the autonomous time is 4.7 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is 4.1 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Off Grid Station Plus (Energy Station Plus)

Design Aspect	Requirement	Technology Performance⁶²
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	320 lumens Wattage is up to 1 Watts
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours (Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. More than or equal to 85% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 8 watt module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) and the autonomous time is greater than 4 hours
Solar Run Times(s) (SRT)	3.5 hours	The solar run time greater

⁶²Lighting Global. Lighting Global Product Testing Verification Energy Station Family. Accessed on June 3rd 2021 at https://storage.googleapis.com/data-platform-storage/TypeApproval_os-esfamily-v11.pdf

for products with solar energy charging systems		than 3.5 hours.
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

Lumn M400

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance⁶³</u>
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	200 lumens (main lamp) 100 lumens (secondary lamp) Wattage is up to 1.6 Watts (main lamp) and 0.8 Watts (secondary lamp)
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours (Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. More than or equal to 85% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 5.5 watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) and the autonomous time is more than 4.5 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is more than 3.5 hours.
Amount of time to fully charge the product using mechanical means or a	Not applicable	-

⁶³VeraSol. Lumn Family. Accessed on June 3rd 2021 at https://storage.googleapis.com/data-platform-storage/VeraSolCertificate_omni-lumnfamily-v2.0-210223.pdf

centralized charging system (e.g. the national grid)		
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

RNT022

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁶⁴
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	320 lumens
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. Equal to or more than 85% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 10W watt polycrystalline silicon module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) and the autonomous time is more than 4 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is more than 3.5 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

⁶⁴ Engineering. Renewit Solar Home Power Station-RNT022 model. Accessed on June 3rd 2021 at <https://www.engineeringforchange.org/solutions/product/renewit-solar-home-power-station-rnt022-model/#:~:text=It%20features%20a%20red%20LED,%3A%2024%20lumens%2F8%20lumens.>

WOWsolar 100

<u>Design Aspect</u>	<u>Requirement</u>	<u>Technology Performance</u> ⁶⁵
Lamp wattage (in Watts) and luminous flux output (in lumens)	Luminous flux output: 25 lumens No separate minimum wattage requirement	140 lumens
Rated lamp life (in hours)	5,000 hours (Option 1, paragraph 17) or 10,000 hours Option 2, paragraph 18). For Option 2, in place of long-term measurement, the relative luminous flux shall not decrease by more than 15% during 2,000 hours of continuous operation.	Option 2 is chosen. More than or equal to 85% of the original output remains after 2,000 hours of run time
Type and rated capacity of the renewable energy equipment used for battery-charging (in Watts)	PV module No separate minimum rated capacity requirement for PV module	PV module is a 10 watt module
Type (e.g. NiMH, Lead-Acid, Li-ion), and rated capacity of the batteries (in Ampere hours)	Li-ion battery preferable No minimum rated capacity of batteries	Battery uses lithium iron phosphate
Type of charge controller (e.g. active or passive)	Passive charge controller	Passive charge controller
Autonomous time and DBT	DBT at least 4 hours	Run time per day of solar charging (DBT) the autonomous time is more than 4 hours
Solar Run Times(s) (SRT) for products with solar energy charging systems	3.5 hours	The solar run time is equal to or greater than 3.5 hours
Amount of time to fully charge the product using mechanical means or a centralized charging system (e.g. the national grid)	Not applicable	-
Physical protection against environmental factors (e.g. rain, heat, insect ingress)	Lamps shall comply with Lighting Africa / Lighting Global Quality Test Method	Product passed Lighting Global Minimum Quality Standards, including physical ingress protection test

All technologies to be distributed were be stand-alone, off-grid lighting products where the energy comes from a rechargeable battery, which are charged by a solar panel. These units provided lighting for individual households.

The following systems had more than 1 lighting point. For these systems each lighting point is considered to be a project lamp:

⁶⁵ VerSol. WOWSolar Family. Accessed on June 3rd 2021 at https://storage.googleapis.com/data-platform-storage/TypeApproval_ai-family-201006.pdf

Model	Lighting Points
Sun King Home 60	3
Sun King Home 120	3
Sun King Home 40z	3
Off Grid Station Plus	3
Lumn M400	3
RNT022	3
WOWsolar 100	3

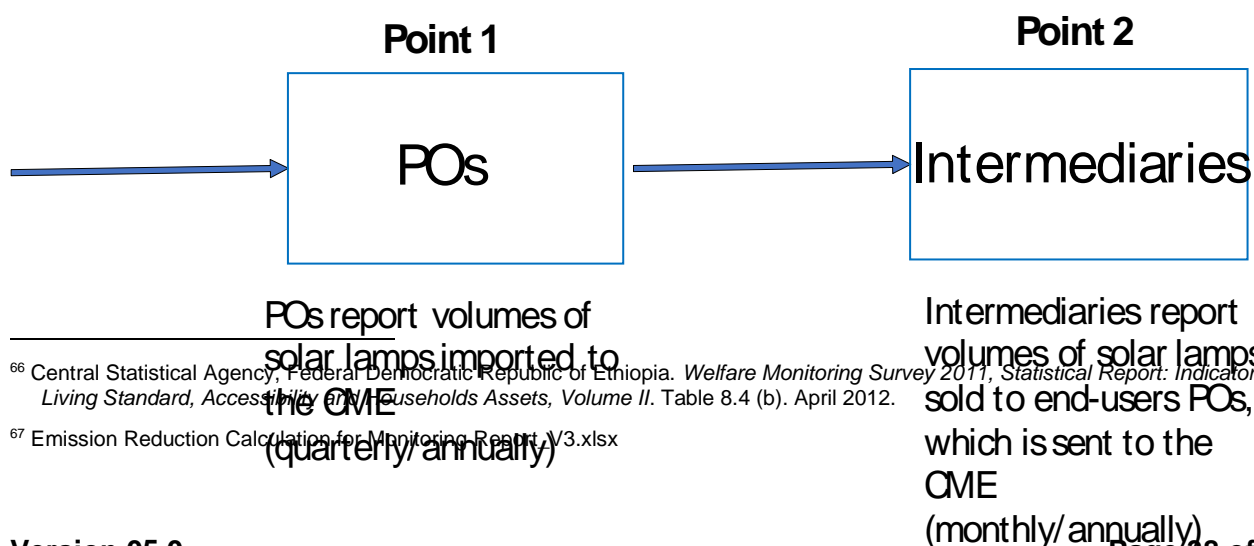
The CPAs reduced GHGs by substituting lighting powered by renewable, solar energy for the use of lamps that rely on burning fossil fuels, namely kerosene. This substitution reduced mainly CO₂ emissions. In the existing scenario, end-users targeted by the CPAs used primarily kerosene for lighting.⁶⁶

A long term line of credit was made available by the World Bank Group's (WBG) International Development Association (IDA) in 2013 for market development of renewable energy and energy efficient products. The credit line has addressed financial constraints across the off-grid technologies' value chains regarding access to finance through DBE by providing working capital loans to private companies importing, distributing and selling renewable technologies. This access to foreign credit has allowed private companies to obtain required upfront capital to import, distribute, install and service solar technologies.

Solar lamps under the CPAs are sold to end-user through different private solar importers who borrow loan under IDA credit line. The solar importers operating under the CPAs are Vera International Business, Rensys, Universal Electronics, Dama Trade, Temesgen Ayana, and Lydetco. Depending on individual business models, sometimes these importers also act as distributors and even as retailers making sales directly to consumers.

Under the IDA credit line, the private solar importers receive financing from the CME to import solar products eligible under the CME's PoA. The agreement between the CME and the private solar importers specifies that the carbon credit rights for products imported through the IDA credit line are conceded to the CME and the private solar importers are required to provide the necessary information for monitoring and tracking of the solar products imported. The CME receives regular reports (monthly or quarterly) from the retailers/importers on the volumes of solar lamps sold by model. The summary of the monthly sales since the start of the CPAs are shown in the emission reduction calculation excel sheet.⁶⁷

The following diagram shows the different monitoring points of the CPA.



⁶⁶ Central Statistical Agency, Federal Democratic Republic of Ethiopia. *Welfare Monitoring Survey 2011, Statistical Report: Indicators on Living Standard, Accessibility and Households Assets, Volume II*. Table 8.4 (b). April 2012.

⁶⁷ Emission Reduction Calculation for Monitoring Report V3.xlsx

Figure 2. Monitoring Points of the CPAs

The emission reduction calculations are based on the sales information from Monitoring Point 2. The volumes sold can be validated from importation records collected at Monitoring Point 1.

C.2. Location of CPAs

The geographical boundary is the borders of the Federal Democratic Republic of Ethiopia. The CPAs were implemented across Ethiopia, as shown in Figure 1 below.

**Figure 3. Map of Ethiopia**

The capital city, Addis Ababa, is located at 9.0300° N and E 38.7400° E.

C.3. Post-registration changes to CPAs

C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies, standardized baselines or other methodological regulatory documents

There are no temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies or standardized baselines during this monitoring period, for any CPAs covered in this monitoring report.

C.3.2. Corrections

CPA 1:

Reference Number: PRC-10285-002

Date of Approval: 03/02/2019

Revisions have been made to various sections of the CPA design document as the document was updated to the latest template. From Version 4.0 to Version 8.1.

The project lamp models under the CPA have been updated to reflect the project lamp models distributed under the CPA.

The CPA was revised to use Option 1 in place of Option 2 under paragraphs 17 and 18 of AMS-III.AR Version 5.0.

The eligibility criteria for the CPA have been revised to reflect the use of Option 1 under paragraph 17 AMS-III.AR Version 5.0. Specifically, eligibility criterion 2, double counting, and eligibility criterion 12, methodology applicability/technology, were revised to reflect the use of Option 1 in the CPA.

CPA 2:

Summary of Corrections Submitted in Parallel to this Issuance Request as a notification via PRC workflow:

Revisions have been made to various sections of the design document as the document was updated to the latest template. From Version 8.1 to Version 9.0.

The number of lamps and timeline for sale/distribution has been updated and systems with more than one lighting point defined.

The CPA was revised to use Option 1 in place of Option 2 under paragraphs 17 and 18 of AMS-III.AR Version 5.0.

The eligibility criteria for the CPA have been revised to reflect the use of Option 1 under paragraph 17 and 18 of AMS-III.AR Version 5.0. Specifically, eligibility criterion 2, double counting, and eligibility criterion 12, methodology applicability/technology, were revised to reflect the use of Option 1 in the CPA.

C.3.3. Changes to the start date of the crediting period

There are no changes to the start date of the crediting period fixed at the inclusion of any of the CPAs covered in this monitoring report.

C.3.4. Inclusion of monitoring plan

CPA 1:

Reference Number: PRC-10285-002

Date of Approval: 03/02/2019

There have been post-registration changes to include a monitoring plan into the CPA-DD, for which the delayed submission of the monitoring plan was chosen by the CME at the time of inclusion of the CPA.

Change notified to the secretariat prior to this monitoring period:

The addition of the monitoring plan to the CPA-DD submitted in parallel to this issuance request as a notification via PRC workflow.

Changes that have been notified as applicable to this monitoring period:

None.

CPA 2:

There have been post-registration changes to include a monitoring plan into the CPA-DD, for which the delayed submission of the monitoring plan was chosen by the CME at the time of inclusion of the CPA.

Change notified to the secretariat prior to this monitoring period:

None.

Changes that have been notified as applicable to this monitoring period:

The addition of the monitoring plan to the CPA-DD submitted in parallel to this issuance request as a notification via PRC workflow.

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

There are no permanent changes to the monitoring plans included in the CPA-DDs, or permanent deviation of monitoring from the applied methodologies, or standardized baseline, or other applied standards or tools for the CPAs covered in this monitoring report.

C.3.6. Changes to project design

There are no changes to the project design of the CPA included in this monitoring report.

C.3.7. Changes specific to afforestation or reforestation CPA

This is not applicable to the CPAs covered in this monitoring report.

SECTION D. Description of monitoring system of CPAs

Operational and Management Structure

The CME is also the CPA Implementer for the CPAs and is responsible for implementing the monitoring plan for the CPAs. Within the office, the CME's PoA Manager was the individual with overall responsibility and sign-off for the implementation of monitoring. The CME directly coordinated with the Partner Organizations (POs), to collect the information on the volume of lamps sold and the sales dates for the program database.

The POs are importers selling directly to customers or distributing products under the CPAs to retailers. The full list of POs as well as the model and volume of lamps under the CPAs is shown below. The monitoring report covers lamp sales from the start date of the CPAs through August

2019. Sales reports from POs to intermediaries do not include the exact sales date, only the month the lamps were sold. As such, the conservative assumption that lamps are with the intermediaries for the 1st day of the following month is applied. As per the methodology, lamps are assumed to be operational 120 days after reaching the intermediaries. Therefore, lamps sold after September 2019 are not operational within the monitoring period as they are deemed to be with the intermediaries from October 1st and operational 120 days after that, which is outside of the monitoring period. Lamps are also deemed inactive 2 years after reaching the customers, as per Option 1 under paragraph 17 of the methodology.

Importer	Model	Total Systems Sold
Dama	OVPilot X	2,072
	MB2-90	393
	MB2-200	25,347
	MB2-290	11,884
	MB2-380	12,085
	Sunking Pro 2	2,225
	Sunking Mobile	345
	Little Sun	26,615
Vera	D-Light S2	115,024
	D-Light S20	21,808
	D-Light S300	33,637
	D-Light D20	8,520
	D-Light D34	4,994
	D-Light D30	2,994
	D-Light S500	8,624
	D-Light D335	10,679
	D-Light S3	209,224
Rensys	D-Light S2	34,067
	D-Light S20	23,959
	D-Light S3	22,290
Lydetco	Sun King Pro 2	17,318
	Sun King Solo	1,894
	Sun King Eco	8,643
	Sun King Mobile	5,409
	Sun King Boom	1,245
	Sun King Pico Plus	20,488
	Sun King Home 60	12,131
Universal	Sunking Eco	107,791
	Sunking Pro 2	20,466
Temesgen Ayana	Sun King Home 60	636
	Sun King Home 120	263
	Sun King Pro 400	2,058
SAT	Off Grid Station Plus	7,578
Lekun Menkir	Sun King Pro 400	1,036
	Sun King Home	12

	40z	
Birtukan	Sun King Home 120	4,510
	Sun King Pro 400	3,500
Meseret	Sun King Home 120	2,498
	Sun King Pro 400	2,042
Green Hope	Off Grid Station Plus	963
Bright Future	Lumn M400	939
BCaD	RNT022	464
	WOWsolar 100	126

Responsibilities and Institutional Arrangements for Data Collection and Archiving

POs reported directly to the CPA implementer on the distribution of solar lamps, including relevant information for the program database related to solar lamp identification, date of sale, identity and any contact information of the end-user, if available. For quality control, it was ensured that only Lighting Africa certified solar lamps were included under the CPAs.

POs involved in importation report the volumes imported to the CME at Monitoring Point 1. POs involved in sales to intermediaries reported the volumes sold to the CME at Monitoring Point 2, after receiving the information from the intermediaries.

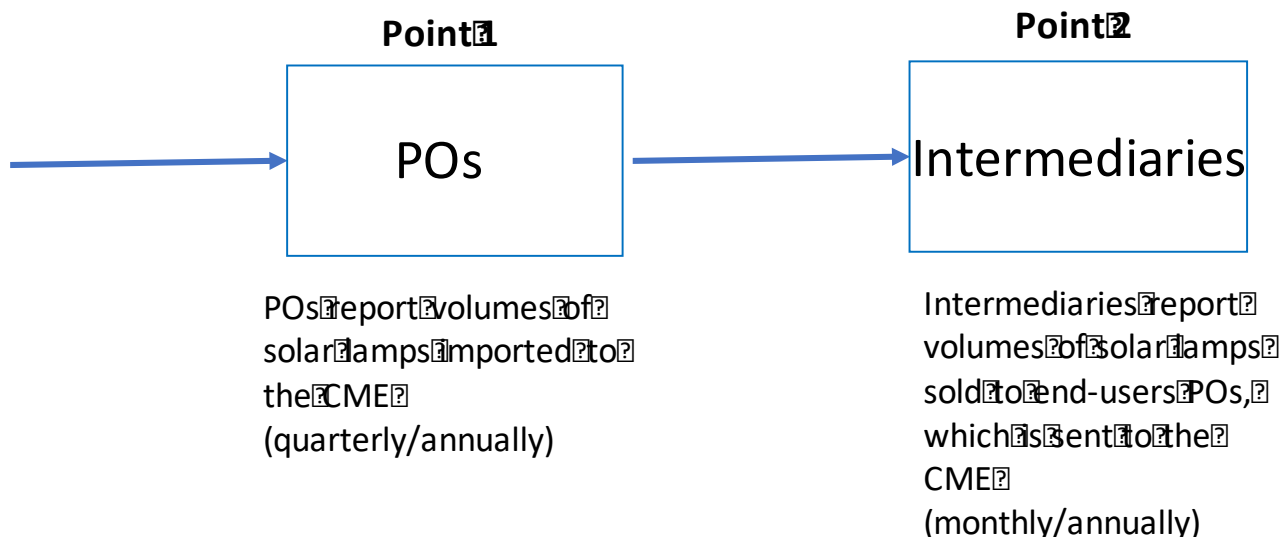


Figure 4. Monitoring Points of the CPA

For the monitoring of the CPAs, the sales data reported to the CME, through the POs, at Monitoring Point 2 were aggregated and used to determine the parameters required for calculating the emission reductions under the CPAs. Sales to intermediaries under Monitoring Point 2 are typically reported monthly. Lamps under the CPAs were assumed to be operational 120 days from the start of the following month, e.g. lamps reported as sold in the sales report of May 2015 were deemed operational 120 days from 01/06/2015. POs under the CPAs are registered private companies, non-profits, or importers and abide by all legal, licensing, and environmental requirements of the Ethiopian government.

No survey or sampling was conducted at this stage as it is assumed, following the methodology, that 100% of lamps are operational. Lamps whose operational life exceeded 2 years were removed from operation under the CPAs.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Data/Parameter	DV
Unit	tCO ₂ per project lamp
Description	Lamp Emission Factor
Source of data	AMS-III.AR Version 5
Value(s) applied	0.092
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	FUR
Unit	L/hour
Description	Fuel Use Rate
Source of data	AMS-III.AR Version 5
Value(s) applied	0.03
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	O
Unit	Hours/day
Description	Utilization Rate
Source of data	AMS-III.AR Version 5
Value(s) applied	3.5
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	U
Unit	Days/Year
Description	Annual Utilization
Source of data	AMS-III.AR Version 5
Value(s) applied	365

Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	EF
Unit	kgCO ₂ /liter
Description	Fuel Emissions Factor
Source of data	AMS-III.AR Version 5
Value(s) applied	2.4
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	n
Unit	-
Description	Number of fuel-based lamps replaced per project lamp
Source of data	AMS-III.AR Version 5
Value(s) applied	1
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

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

Data/Parameter	LF
Unit	-
Description	Leakage Factor
Source of data	AMS-III.AR Version 5
Value(s) applied	1.0

Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of leakage
Additional comments	

Data/Parameter	NTG
Unit	-
Description	Net-to-gross adjustment factor
Source of data	AMS-III.AR Version 5
Value(s) applied	1.0
Choice of data or measurement methods and procedures	Methodology default value
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

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

E.2. Data and parameters monitored

Data/Parameter	$N_{i,j}$
Unit	-
Description	Number of project lamps distributed to end users of type i with charging method j
Measured/calculated/default	Measured
Source of data	Sales Records

Value(s) of monitored parameter	<p>Summation of lamps sold of type i with charging method j during year y. All lamps are charged through solar panels, i.e. have the same charging method j. While the battery type and wattage of the different lamp models varies, they are deemed the same type i as the emission reductions per lamp are identical across all models.</p> <p>The attached excel sheet showing the emission reduction calculations shows the monthly or annual lamp sales for the different solar vendors. Lamps sold are assumed to be in operation from the start of the following month. For annual sales, lamps are assumed operational from the start of the following year. Only the solar vendor Universal reported annual sales for the Sinking Eco in 2017.⁶⁸</p> <p>The total number of lamps sold during the CPAs is 803,642.</p>
Monitoring equipment	N/A
Measuring/reading/recording frequency	Continuous
Calculation method (if applicable)	Summation of project lamps distributed
QA/QC procedures	The sales records maintained by the CME are cross-checked with import records maintained by the CME and the sales records maintained by the distributors
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	

Data/Parameter	$OF_{y,i,j}$
Unit	Fraction
Description	The 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
Measured/calculated/default	The CPA uses Option 1 under paragraph 17 of the methodology. The value is equal to 100% for year 1 and 2. After 2 years of operation lamps are not credited.
Source of data	Surveys
Value(s) of monitored parameter	The CPA uses Option 1 to determine the lamp effective useful life, the value is assumed to be 100% for lamps in year 1 and 2.
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	No applicable
QA/QC procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

E.3. Implementation of sampling plan

There was no sampling for this monitoring period.

⁶⁸Emission Reduction Calculation for Monitoring Report 2_V1.xls

SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

As described in section E.2, the number of lamps in operation during the monitoring period is 657,270. As per the methodology, the Lamp Emission Factor, DV , is calculated based on the Utilization Rate, O . As the monitoring period covers more than 365 days and lamps are sold continuously throughout the monitoring period, the number of lamps-days was determined from the number of project lamps distributed, $N_{i,j}$. The number of lamp-days is then divided by 365 to represent lamp-years, which are multiplied by the Lamp Emission Factor, DV . The start date of the CPA is 21/01/2015, so only lamps deemed operational from 01/02/2015 have been included in the CPA.

For the Sinking Eco lamps sold by Universal in 2017, an annual sales report was submitted in place of a monthly report. As such, the lamps are deemed to be with the intermediaries from 01/01/2018 and with end-users 120 days later. The 2-year operational life starts from the day the lamps are assumed to be with end-users.

The total number of operational lamps days are determined in the attached emission reduction calculation worksheet.⁶⁹ Lamps reported sold in a given month were deemed operational 120 days after the start of the subsequent month. The total lamp days for all operational lamps during the CPA were then added together and divided by 365 to determine the total operational lamp-years during the monitoring period. Lamps whose operational life exceeded 2 years were removed from the CPA. For systems with more than one lighting point, each lighting point is considered one project lamp.

Total Lamps: 803,642

Total Lamp Days During Monitoring Period: 137,209,334 + 171,027,628 = 308,236,962 lamp-days

Number of full-time project lamps = 308,236,962 / 365 days/year = 844,485 lamp-years

Baseline emissions for the monitoring period were calculated as follows:

$$ER_y = \sum_{i,j} N_{i,j} * BE_{y,i} * OF_{y,i,j}$$

Where:

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 be equal to 100% for years 1 and 2

With:

$$BE_y = DV * GF_y * DB_y$$

Where

BE_y Baseline emissions per project lamp in year y (t CO₂e)

GF Grid Factor in year y , Equal to 1.0 since charging option defined in paragraph 3(a) is used

DB_y Dynamic Baseline Factor (change in baseline fuel, fuel use rate, and/or utilization during crediting period) in year y , Option 1: default of 1.0 in the absence of relevant information

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

⁶⁹Emission Reduction Calculation for Monitoring Report 2_V1.xlsx

And:

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

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

The operational fraction $OF_{y,i,j}$ is assumed to be 100% for all lamps for the first three years of operation. All lamps under the activity are either vintage 1 or 2. The number of full-time operational lamps as per the monitoring exercise is 468,569.

$$\begin{aligned}
 ER_y &= \sum_{i,j} N_{i,j} * BE_{y,i} * OF_{y,i,j} \\
 &= 844,485 * 0.092 \text{ tCO}_2 * 100\% \\
 &= 77,693 \text{ tCO}_2
 \end{aligned}$$

F.2. Calculation of project emissions or actual net removals

As per AMS-III.AR Version 5, the project emissions assumed to be 0 as all technologies under the project activity fall under paragraph 3(a) of the methodology. As per paragraph 23 of the methodology, project emissions are 0.

F.3. Calculation of leakage emissions

As per AMS-III.AR Version 5, the leakage factor is assumed to be 1.0 therefore leakage is not calculated.

F.4. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
10285-P1-0001-CP1	34,584	0	0	0	34,584	0	34,584
10285-P1-0003-CP1	43,108	0	0	0	43,108	0	43,108
Total	77,693	0	0	0	77,693	0	77,693

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO ₂ e)
10285-P1-0001-CP1	34,584	21,927
10285-P1-0003-CP1	43,108	104,500
Total	77,693	126,427

F.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the CPA-DD”

The emission reductions achieved during the monitoring period are determined as follows:

Estimated ex ante emission reductions from CPA 1:

01/11/2017 – 31/12/2017: 22,080 tCO₂e

01/01/2018 – 31/12/2018: 18,247 tCO₂e

01/01/2019 – 31/12/2019: 0 tCO₂e

As the monitoring period only covers through 01/11/2017 this represents 1/6 fraction of the year. As such the anticipated ex ante emission reductions for the monitoring period are:

$$18,247 \text{ tCO}_2\text{e} + 22,080 \text{ tCO}_2\text{e} * 1/6 = 21,927 \text{ tCO}_2\text{e}$$

Estimated ex ante emission reductions from CPA 2:

01/02/2018 – 31/12/2018: 20,900 tCO₂e

01/01/2019 – 31/12/2019: 41,800 tCO₂e

01/01/2020 – 31/12/2020: 41,800 tCO₂e

The crediting period for CPA 2 only begins on 01/02/2018, as such the anticipated ex ante emission reductions for the monitoring period are:

$$20,900 \text{ tCO}_2\text{e} + 41,800 \text{ tCO}_2\text{e} + 41,800 \text{ tCO}_2\text{e} = 104,500 \text{ tCO}_2\text{e}$$

F.6. Remarks on increase in achieved emission reductions

The emission reductions during the monitoring period are lower than the estimated ex ante emissions. Together, the CPAs achieved 62 per cent of the anticipated ex-ante emission reductions. The reason for the lower than expected emission reductions is the lower than expected volume of solar lamps sold/distributed under CPA 2 since the start of the CPA, allowing for less lamps to be operational during the monitoring period.

F.7. Remarks on scale of small-scale CPAs

Both CPAs demonstrate additionality through Methodological Tool 19 Version 8 Demonstration of additionality of microscale project activities, and as such have the size limit applicable to the CDM unit level and are exempt from the small-scale limit of 60,000 tCO₂e per year for each CPA. Even so, the CPAs have not exceeded this limit.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.0	8 October 2021	Revision to: Ensure consistency with version 03.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07- STAN).
04.0	6 April 2021	Revision to: <ul style="list-style-type: none"> • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods; • Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods; • Make structural and editorial improvements.
02.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for programmes of activities (CDM-EB93-A07-STAN); • Make editorial improvements.
01.0	1 April 2015	Initial publication.
Decision Class: Regulatory		
Document Type: Form		
Business Function: Issuance		
Keywords: monitoring report, programme of activities		