Monitoring report form

(Version 05.1)

MONITORING REPORT	
Title of the project activity	Distribution of Energy Savings Lamps in Madagascar – Project 1
Gold Standard reference number of the project activity	GS1334
Version number of the monitoring report	2.0
Completion date of the monitoring report	15/05/2018
Monitoring period number and duration of this monitoring period	Period: 3 Duration: 01/01/2017 – 31/12/2017
Project participant(s)	- WWF MWIOPO (World Wide Fund for Nature Madagascar & Western Indian Ocean Program Office) - WWF Switzerland - Foundation myclimate
Host Party	Madagascar
Sectoral scope(s)	Energy efficiency, type “Relighting”
Selected methodology(ies)	AMS-II.J Demand-side activities for efficient lighting technologies, Version 04 Tool to calculate the Emission Factor for an electricity system, V03.0.0
Selected standardized baseline(s)	N.A.
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	8,111 tCO2e
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards 5,854 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

a) The project is the distribution of around 540,000 high quality CFLs (Compact Fluorescent Lamps) to grid-connected households in the city of Antananarivo in Madagascar to replace inefficient ICLs (Incandescent Lamps). Further, the project aims at moving towards the establishment of a regulatory framework promoting good quality lamps at an affordable price on the market. Efficient lamps reduce domestic electricity consumption from the grid and in this way they reduce CO2 emissions from thermal power plants in Madagascar.

b) The technology installed is a 14-Watts self-ballasted compact fluorescent lamp with a rated lifetime of 10,000 hours.

c) The CFLs were sold to household at a subsidized price during the period Sept 2013 to Dec 2014.

d) Total GHG emissions reductions achieved during the third monitoring period are **5,854 tCO2e**

A.2. Location of project activity

>> City of Antananrivo and its surroundings, Analamanga Province, Madagascar

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Madagascar (host)	Private Entity - WWF MWIOPO (World Wide Fund for Nature - Madagascar & Western Indian Ocean Program Office)	No
Switzerland (Annex 1)	Private Entity - WWF Switzerland	No
Switzerland (Annex 1)	Private Entity - Foundation myclimate	No

A.4. Reference of applied methodology and standardized baseline

>> This project applies the methodology AMS II.J “Demand-side activities for efficient lighting technologies, Version 04”.

Furthermore, for calculation of grid emission factor the “Tool to calculate the Emission Factor for an electricity system, V03.0.0” was used.

A.5. Crediting period of project activity

>> Fixed crediting period of 10 years.

A.6. Contact information of responsible persons/entities

Tobias Hoeck, Foundation myclimate
Solo Thierry Randriamanalina, WWF MWIOPO (World Wide Fund for Nature - Madagascar & Western Indian Ocean Program Office)
For details see Appendix 1.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

Distribution of CLFs: The CFL distribution officially kicked off on 23 September 2013. Various dissemination approaches were implemented including fixed distribution points in JIRAMA's[1] offices, distribution campaigns in different areas of the city, special distribution operation for companies' employees, and door-to-door sale at household level. A total of 125 volunteers and distribution agents were mobilized to conduct the CFL distribution. Thanks to the combined distribution approaches 518,248 CFLs have been sold to 128,598 households by the end of December 2014.

Awareness campaigns: The awareness campaign for the collection of used CFLs started on 14 September 2017 in the first of six districts in Antananarivo. The campaign started with the training of CFL collection agents in the Fokontany (local administrative unit). Five representatives of each Fokontany are invited for a one-day training during which the purpose of the campaign was explained and representatives were trained on the correct message to be communicated to the population. The awareness campaign consisted of three days of proximity communication that combines door-to-door sensitization, distribution of flyers, posters indicating the location of collection bins and explaining how collected lamps will be treated and safely disposed. By December 2017 the campaign was implemented in all 6 districts. The official launch has been covered by the local media which was invited to come to one of the Fokontany.

Posters and Flyers used for the campaign

[1] Stands The National utility provider. A partner of the CFL distribution project.

Collection bins located in the Fokotany in Antananarivo

Distribution of flyers and awareness creation of Fokotany representatives for collection of CFLs

Collection and destruction of ICL: As required by the applied methodology, the collected incandescent lamps were destroyed in April 2015. The ICLs have been crushed with a steamroller. The destruction of the ICLs has been documented on a time-stamped video.

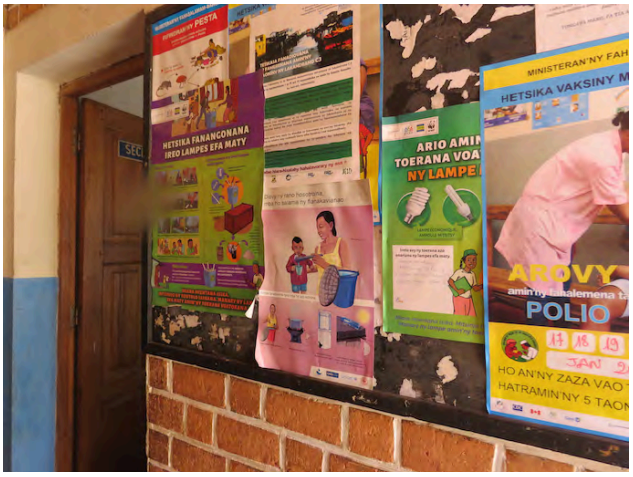
Collection of used CFLs: From July to October 2016, a pilot for the collection of end-of-life CFLs was implemented. The door-to-door approach and voluntary disposal of used lamps have been tested in 4 Fokontany in Antananarivo. As a result, about 400 used lamps were collected during the campaign. The pilot was implemented by a committee constituted of the SAMVA (The organization in charge of garbage collection in Antananarivo), the Fokontany with local associations (in charge of garbage collection at the household level), the Ministry of energy and WWF. An action plan taking into account the lesson learned during the pilot was developed.
A partnership between the Ministry of Energy, the "Service Autonome de Maintenance de la Ville d'Antananarivo" (SAMVA which is in charge of the garbage collection in Antananarivo) and WWF has been put in place and signed in July 2017 in order to carry out the collection of used CFLs. SAMVA has taken a central role in the training of Fokontany agents and implementation of the collection. The collection campaign started on 14 September 2017 and covered 60 Fokontany (local administrative units) in the six districts of the city of Antananarivo.
The campaign started with the training of agents in the Fokontany. Five representatives of each Fokontany were invited for a one-day training during which they were explained the purpose of the campaign and trained on the correct message to be communicated to people.
The campaign consisted of three days of proximity communication that combined door-to-door sensitization, distribution of flyers, posters indicating the location of collection bins and explaining

what will be done with the lamps once collected. The following results have been achieved up to end of 2017:

- 300 agents from the Fokontany have been trained on different aspects of the project such as: the handling of the used CFLs, the message to be delivered to the households in order to motivate them and the collection system;
- 300 posters have been placed in the districts;
- About 50,000 flyers have been distributed to the households;
- 1,111 used fluorescent lamps have been collected during the campaign;
- 653 used lamps have been collected at Fokotany level;
- 240 Collection bins have been put in place.

The shares of collected lamps is as follows:

	Tube	CFL	Other	Total
Campaign	694	395	22	1,111
Fokotany	188	404	61	653
Total	583	1,098	83	1,764



Posters and bin for collection of fluorescent lamps

Disposal of used CFLs: As for the processing of the used lamps, a compact integrated device was identified as the most feasible solution for the least cost. It is a small device called «bulb eater»[2] which extracts the mercury from the CFLs. The output is clean and can be disposed in the waste dump. SAMVA has provided a space in the waste dump for the processing of used CFLs. It is part of the partnership that has been put in place for the collection campaign od used CFLs.

The bulb eater was ordered and imported to Madagascar and is currently awaiting customs clearance. Once cleared, the device will be installed in Andralanitra and will be operated by SAMVA. The device will be operational in spring 2018.

Regulatory framework:

In November 2015, the Ministry of Energy publicly announced, during the celebration of the International Energy Day, that a ban on incandescent lamps is planned. This announcement follows the advocacy efforts and works initiated by WWF for introducing standards of the lamp market in Madagascar. Furthermore, energy efficiency is among the key orientation of Madagascar's New Energy Policy (NEP)[3] which was formally presented by the Ministry of Energy during the celebration of this day. The NEP mentions in particular: «for households, measures of energy efficiency in electricity consumption (low consumption light bulbs and electric equipment) will be adopted by 60% of households by 2030 and support programs to raise awareness on access to adapted technologies

[2] http://www.aircycle.com/bulb-eater-premium/

[3] http://www.ore.mg/Publication/Rapports/LettreDePolitique.pdf

will be conducted». The decree proposition has been drafted and has been approved by both the Ministry of Energy and Commerce after some back and forth. WWF is following closely to ensure its adoption by the Council of Government.

Starting from May 2016, the Ministry of Energy's and the Ministry of Commerce's Technical staff, with the support of WWF, worked for the adoption by the Government Board, announcing the upcoming ban on importing and selling incandescent lightbulbs, as well as lamps that are not approved by a standard. The examination of the decree at Government council was adjourned several times. The decree is currently at the Ministry of Industry level for technical feedback. It will then be sent to the Prime Ministry Direction in charge of legal Affairs for technical feedback before attempting a new introduction to the Government Board.

In parallel to that, WWF is supporting the adoption of International Standards on residential lighting. A National Committee on standards has been put in place and is working on the adoption of standards from the International Electrotechnical Commission (IEC). This is a work in progress as the standards will need to be officially adopted by the Government once officially proposed by the Committee.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>> none

B.2.2. FARs

There are three FARs from second verification and issuance review:

Forward Action Request # 1: The PP shall submit at the time of next verification supporting documentation of the awareness raising campaign concerning the collection/safe disposal of used/broken CFLs. The awareness raising campaigns shall be started as soon as possible.
-> see Section B.1 for information on awareness campaign including pictures. The campaign started in September 2017.

Forward Action Request # 2: The PP shall mention the name of the HH owner for the next monitoring survey and assign only once a sheet number to a household and not the same number to different households.
-> The next monitoring survey is due in 2018. Thus, this FAR is not relevant for this monitoring period.

Forward Action Request # 3: The PP shall submit at the time of next verification supporting documentation in regards to safe storage (until the lamp treatment facility is operational by end of 2017) and subsequent recycling/safe disposal of CFLs.
-> The collected lamps are temporarily stored at SAMVA office. The lamps will be moved in a container as soon as it is installed in the waste dump. The container is planned to be installed by the end of 2018.

B.2.3. Changes to start date of crediting period

>> The crediting period starts after dissemination of all project CFLs have been completed. Distribution of CFLs was completed by end of 2014. The start date of the crediting period is 01/01/2015.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

>> none

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>> none

B.2.6. Changes to project design of registered project activity

>> none

B.2.7. Types of changes specific to afforestation or reforestation project activity

>> N.a.

SECTION C. Description of monitoring system

Distribution of CFLs:
There were three distribution strategies that were adopted during the distribution.

- The first one is the "pull strategy" where customers come to one of the distribution points to exchange their ICLs into the project's CFLs. Each household must bring along the latest electricity bill (issued by JIRAMA) and the national identity card to the nearest distribution point (TELMA Shop or JIRAMA's office). Then, the agent register name and JIRAMA customer in the database using a software that was specially designed for the project. This procedure allows the unique identification of each household participating in the project and to record number and wattage of ICL that are replaced with project CFLs. Every time a household wishes to hand in ICL in exchange for project CFLs and information is entered in the database, it is automatically checked by the system if this household has already received CFLs and if yes how many. Once the maximum number of ICL to be exchanged by each household has been reached, the system does no more allow the exchange of further lamps.
- The second is a proximity strategy were distribution points are made available nearer to the customers. The recording and data entry is the same as in the first strategy.
- The third strategy is a door-to-door approach, which consisted of going directly into the households and exchanging their ICLs into CFLs. First, the distribution agents check that the households have working and installed ICLs and are willing to make the exchange of lamps. After, the JIRAMA's unique identifier, the household's responsible identification card information, the number of ICLs to be exchanged with their wattages and the price are recorded in a sheet of paper. A hand-written receipt is then given to the household with the CFLs. The information is recorded in the database with the software afterwards. In order to make sure that the information that is entered is accurate, a supervisor systematically checks the recorded data and compares it to the hand-written record.

Monitoring survey:
The first monitoring survey was conducted in 2015 (year 1) and results are still valid for this monitoring period. The next monitoring survey is due in 2018 (year 4).

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	**$P_{i,PJ}$**
Unit	Watts
Description	Rated power of the project lighting devices of the group of "i" lighting devices (Watts)

Source of data	Lamp specifications from CFL supplier/ Lab Test Report for project CFL
Value(s) applied)	14W
Choice of data or measurement methods and procedures	N.A.
Purpose of data	For ER calculation
Additional comments	There is only one type of project CFL distributed.

Data/parameter:	**O_i**
Unit	Hours per 24hrs period
Description	Operating hours of the project and baseline lamps per 24hrs period
Source of data	AMS-II.J, page 3.
Value(s) applied)	3.5
Choice of data or measurement methods and procedures	Default value as per Option 1 in paragraph 11. (ii) on page 3 of the applied methodology AMS-II.J.
Purpose of data	For ER calculation
Additional comments	This value is fix for the entire crediting period.

Data/parameter:	**NTG**
Unit	Fraction
Description	Net-to-gross adjustment factor
Source of data	AMS-II.J, V04, page 4
Value(s) applied)	0.95
Choice of data or measurement methods and procedures	Default value as per applied methodology
Purpose of data	ER calculation
Additional comments	None

Data/parameter:	**TD_i**
Unit	Fraction
Description	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction
Source of data	AMS-II.J, V04, page 4
Value(s) applied)	0.1
Choice of data or measurement methods and procedures	Default value as per applied methodology
Purpose of data	ER calculation
Additional comments	None

Data/parameter:	**L_i**
Unit	Hours
Description	Average Life (or Rated Average Life until average life value is available) for equipment type i (hours)
Source of data	Manufacturer information
Value(s) applied)	10,000

Choice of data or measurement methods and procedures	Rated average life as per manufacturer information
Purpose of data	ER calculation
Additional comments	None

Data/parameter:	**R_i**
Unit	%
Description	% of lamps of type i operating at the end of average life or the rated average life (use a value of 50)
Source of data	AMS-II.J, V04, page 5
Value(s) applied)	50%
Choice of data or measurement methods and procedures	Defaults value as per applied methodology
Purpose of data	ER calculation
Additional comments	None

Data/parameter:	**X_i**
Unit	Hours
Description	Number of operating hours per year for equipment type i (hours)
Source of data	AMS-II.J, V04, page 5
Value(s) applied)	1277.5 hours
Choice of data or measurement methods and procedures	Xi = Oi x 365 = 3.5 x 365 = 1277.5 hours
Purpose of data	ER calculation
Additional comments	None

Data/parameter:	**$EF_{CO2,ELEC,y}$**
Unit	tCO2/MWh
Description	Grid emission factor in year y
Source of data	Calculated in files: - 130604_GEF_Madagascar_Report_V01.pdf - 111220_GEF_Madagascar_V01.xlsx - 111220_Antananarivo_lambda.xlsx
Value(s) applied)	0.589
Choice of data or measurement methods and procedures	Value was calculated according to the “Tool to calculate the Emission Factor for an electricity system, V03.0.0”.
Purpose of data	ER calculation
Additional comments	The grid emission factor is calculated ex-ante and fix for the entire crediting period.

D.2. Data and parameters monitored

Data/parameter:	**$Q_{PJ,I}$**
Unit	Number (quantity)

Description	Number (quantity) of pieces of equipment (CFLs) of type i distributed or installed under the project activity (units).
Measured/calculated/default	Measured
Source of data	Project's sale database and results of first ex-post monitoring survey
Value(s) of monitored parameter	518,248 sold according to sales database 434,292 installed according to first ex-post monitoring survey 2015
Monitoring equipment	Sales software and monitoring questionnaires
Measuring/reading/recording frequency:	Continuous during sales
Calculation method (if applicable):	Number of CFLs sold as per project's sale database adjusted with percentage of CFLs installed and operating based on results of first ex-post monitoring survey.
QA/QC procedures:	Following generic instructions for conducting surveys and sampling as per paragraph 20 of applied methodology.
Purpose of data:	ER calculation
Additional comments:	This parameter is not updated for 3rd monitoring period

Data/parameter:	**$P_{i,BL}$**
Unit	Watts
Description	Rated power of the baseline lighting devices of the group of "i" lighting devices (Watts)
Measured/calculated/default	Measured
Source of data	Project's sale database: power rating of all functional ICL handed in for exchange of a project CFL are recorded in the sale database.
Value(s) of monitored parameter	25 W: 0.6% 40 W: 20.5% 60 W: 35.3% 75 W: 31.5% 100 W: 12.1%
Monitoring equipment	Sales software
Measuring/reading/recordin g frequency:	Continuous during sales
Calculation method (if applicable):	Reading the value of rated power as marked on the ICL. Wattage of ICL is recorded in the sale database.
QA/QC procedures:	Training of staff on proper use of sales database and of handling and testing of ICL.
Purpose of data:	ER calculation
Additional comments:	This parameter is not updated for 3rd monitoring period

Data/parameter:	**LFR_y**
Unit	Fraction
Description	Lamp Failure Rate for equipment type i in year y (fraction)
Measured/calculated/default	Measured
Source of data	Ex-post monitoring surveys 2015
Value(s) of monitored parameter	
Monitoring equipment	Survey questionnaire
Measuring/reading/recording frequency:	Once every 3 years

y	1	2	3	4	5	6
LFR	7.2%	14.4%	21.6%	28.8%	36%	43.2%

Calculation method (if applicable):	LFR is the percentage of project CFLs not found operational during the surveys compared to total number of CFLs installed. Linear extrapolation of LFR based on first ex-post monitoring survey results.
QA/QC procedures:	Following generic instructions for conducting surveys and sampling as per paragraph 20 of applied methodology.
Purpose of data:	ER calculation
Additional comments:	This parameter is not updated for 3rd monitoring period.

Sustainability indicators:

Data/parameter:	**SD 1: Recycling/disposal of CFLs**
Unit	%
Description	Percentage of failed/returned CFLs recycled or disposed
Measured/calculated/default	Measured
Source of data	WWF records
Value(s) of monitored parameter	0% of collected lamps have been treated or safely disposed so far. Lamp treatment technology is expected to start operations in June 2018. Lamps have been collected and are stored in a container until they are treated and safely disposed. 1,111 failed lamps have been collected in 2017 and are stored in a container at SAMVA's place. Another 658 lamps have been collected at Fokotany level. In 2016 the project collected 400 lamps. Total lamps collected amounts to 2,164.
Monitoring equipment	CFL tracking records
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Failed CFLs will be collected in the collection points in JIRAMA and transported regularly for recycling or disposal.
QA/QC procedures:	Accurate data recording
Purpose of data:	Ensure sustainability
Additional comments:	None

Data/parameter:	**SD 1: Option for recycling or disposal of CFL**
Unit	Option 1-3
Description	Option 1: Build up a CFL recycling facility in Madagascar Option 2: Identify a recycling facility abroad and export failed CFLs for recycling. Option 3: Environmentally safe and permanent disposal of CFLs with special attention to mercury.
Measured/calculated/default	N.A.
Source of data	WWF Madagascar
Value(s) of monitored parameter	Option 1 is chosen: Treatment (removing the mercury from the CLFs) and safe permanent disposal of CFLs in a designated area in the landfill. The recycling technology called "BulbEater" (http://www.aircycle.com/bulb-eater-premium/) will be applied. The device is currently awaiting customs clearance in Madagascar. It is expected that the device will be operational in June 2018.
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Once recycling facility is operational.

Calculation method (if applicable):	N.A.
QA/QC procedures:	N.A.
Purpose of data:	Ensure sustainability
Additional comments:	None

Data/parameter:	**SD 2: CFL breakage**
Unit	Number and %
Description	Number and percentage of CFLs broken during distribution (handling, transport, etc.)
Measured/calculated/default	Measured
Source of data	Sales Database, WWF records
Value(s) of monitored parameter	Number of CFLs failed during distribution: 4,543 (0.88%) Number of CFLs broken during distribution: 234 (0.05%) Inventory on failed and broken lamps was done after the end of distribution period in February 2015.
Monitoring equipment	N.A.
Measuring/reading/recording frequency:	Each week and at the end of the distribution
Calculation method (if applicable):	Regular Inventories: broken CFLs are counted and recorded in the project database/software
QA/QC procedures:	Accurate data recording
Purpose of data:	Ensure sustainability
Additional comments:	This parameter was not updated for 3rd monitoring period

Data/parameter:	**SD 3: Total electricity savings due to CFL use**
Unit	GWh/year
Description	Total electricity savings in GWh per year due to CFL use
Measured/calculated/default	Calculated
Source of data	Project database
Value(s) of monitored parameter	2017: 9.938 GWh If we also consider the CFLs not counted for ER due to higher wattage of baseline ICL (75W and 100W) the achieved savings amount to 23.530 GWh.
Monitoring equipment	Sales database and monitoring questionnaires
Measuring/reading/recording frequency:	Once all CFLs have been distributed; thereafter annually
Calculation method (if applicable):	Calculation of net electricity savings using the formula in the applied methodology under consideration of actual number of CFLs distributed and actual lamp failure rate monitored.
QA/QC procedures:	Calculation method as per applied methodology
Purpose of data:	Ensure sustainability
Additional comments:	None

Data/parameter:	**SD 4: Average monetary savings per household**
Unit	%
Description	Average monetary savings per household in % due to CFL usage
Measured/calculated/default	Calculated
Source of data	Baseline and monitoring surveys

Value(s) of monitored parameter	20 % monetary savings per household A household saves 117,9924 Ar. per year on electricity.
Monitoring equipment	Monitoring questionnaires
Measuring/reading/recording frequency:	Every 3 years
Calculation method (if applicable):	A random sample of customers visited for the monitoring survey. Compare monthly electricity bills before and after installation of CFLs. Monthly electricity bill in baseline: 49,413 Ar. (baseline survey 2011) Monthly electricity bill in project: 39,586 Ar, (monitoring survey 2015) Monthly savings: 9,827 Ar. (calculated) Annual savings: 117,924 Ar. (calculated)
QA/QC procedures:	Accurate data recording
Purpose of data:	Ensure sustainability
Additional comments:	This parameter is not updated for 3rd monitoring period

Input and grievance mechanism:

Input and grievance expression notebooks are available in the two WWF offices in Antananarivo. In 2017 comments were received via phone calls. Comments are reported in an excel file.

Input and grievance expression notebooks are now also available in the 60 Fokontany were the collection has been carried out. It is also possible to contact the person responsible for the project at WWF's office.

D.3. Implementation of sampling plan

The ex-post monitoring survey was conducted by the project owner according to the guidelines as set out by the applied methodology (AMS-II.J) and following the design details of the baseline survey. The following survey principles from Paragraph 20 of the methodology are considered:

- Minimum sample size is 100. Sample size is determined by minimum 90% confidence interval and the 10% maximum error margin.
- Applying random sampling methods considering representativeness of target population (size, location).
- Household interviews are conducted by site visits.
- Only persons over age 12 are interviewed.

SECTION E. Calculation of emission reductions or GHG removals by sinks

Emissions reductions are calculated using the following calculation steps:

i) Nameplate/rated power (Watts) of the baseline incandescent lamps to be replaced:
Data on the share of ICL in the baseline with different rated power was collected in the first ex-post monitoring survey conducted in 2015. ICL with wattage < 25W are not eligible and will thus not be accepted by the project. The project CFL has a lumen output of $\geq$ 850 lm, which is equivalent to ICL with 69W. Households that want to exchange ICL of 70-100W will be informed that the lumen output (brightness) of the project CFL is lower. If households still want to exchange their ICL for project CFLs, the project will accept and hand out CFLs. However, these CFLs are not counted for emission reductions since they do not fulfill the requirement of minimum lumen output.

ii) Determine operating hours of the project (and baseline) lamps:
Option 1 is applied using the default value of 3.5 hours per 24 hours period for "daily operating hours" (factor O_i). This value is used throughout the crediting period and no survey to determine O_i is required.

iii) Calculate annual gross electricity savings:

(1) $ES_i = (P_{i,BL} - P_{i,PJ}) * O_i * 365 / 1000$
$= (P_{i,BL} - 14) * 3.5 * 365 / 1000$

Where:

ESi : Estimated annual electricity savings for equipment of type *i*, for the relevant technology (kWh)
Pi,BL : Rated power of the baseline lighting devices of the group of "i" lighting devices (Watts)
Pi,PJ : Rated power of the project lighting devices of the group of "i" lighting devices (Watts)
Oi : Average daily operating hours of the lighting devices replaced by the group of "i" lighting devices. For ex post values use 3.5 hours per 24 hour period.

iv) Calculate annual net electricity savings (NES):

(2) $NES_y = \sum Q_{PJ,I} * (1 - LFR_{i,y}) * ES_i*(1/(1-TD_i)) * NTG$
$= \sum Q_{PJ,I} * (1 - LFR_{i,y}) * ES_i*(1/(1-0.1)) * 0.95$

Where:

NES_y : Net electricity saved in year y (kWh)
$Q_{PJ,I}$: Number (quantity) of pieces of equipment (CFLs) of type i distributed or installed under the project activity (units). In total for all "i", this value shall be equal to or less than the documented number of all baseline incandescent lamps destroyed. Once all of the project CFLs are distributed or installed, QPJ,i is a constant value independent from y
ES_i : Estimated annual electricity savings for equipment of type *i*, for the relevant technology (kWh)
$LFR_{i,y}$: Lamp Failure Rate for equipment type i in year y (fraction)
TD_i : Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction.
NTG : Net-to-gross adjustment factor

Lamp failure rate:

If $y*X_i < L_i$, $LFR_y = y * X_i * (100 - R_i) / (100 * L_i)$
If $y*X_i >$or$= L_i$, $LFR_{i,y} = 1$

If $y*1277.5 < 10{,}000$, $LFR_y = y * 1277.5 * (100 - 50) / (100 * 10{,}000)$
If $y*1277.5 >$or$= 10{,}000$, $LFR_{i,y} = 1$

Where:

$LFR_{i,y}$: Lamp Failure Rate for equipment type i in year y (fraction)
L_i : Average Life (or Rated Average Life until average life value is available) for equipment type i (hours)
R_i : % of lamps of type i operating at the end of average life or the rated average life (use a value of 50)
X_i : Number of operating hours per year for equipment type i (hours)
y: Counter for year

(3) $ER_y = NES_y \times EF_{CO2,ELEC,y}$
$= (\sum Q_{PJ,I} * (1 - LFR_{i,y}) * ((P_{i,BL} - 14) * 3.5 * 365 / 1000) *(1/(1-0.1)) * 0.95) \times 0.589$

Where:

$EF_{CO2,ELEC,y}$ Emission Factor in year y calculated in accordance with the provisions in AMS-I.D (tCO2/MWh)
$ER_{i,y}$ Emission Reductions in year y (tCO2e)

E.1. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	7,990	2,136	0	N.A.	5,854	5,854

E.2. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	8,111	5,854

E.3. Remarks on difference from estimated value in registered PDD

>> ER estimated in the PDD are higher than actual ER achieved during the monitoring period. This is due to the following reasons:

- Less CFLs have been distributed than assumed (518,248 vs. 540,000)
- The percentage of lamps not installed is higher than assumed (16.2% vs. 10%)
- The share of 70W and 100W ICL that cannot be counted for ER is higher than in the baseline survey (43.6% vs. 23.7%)

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☐ Project participant **x** Person/entity responsible for completing the CDM-MR-FORM
Organization name	Foundation myclimate
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