




**Verification and certification report form for
CDM project activities
(Version 02.1)**

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

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project UNFCCC ref number: 3404
Version number of the verification and certification report	05
Completion date of the verification and certification report	27/03/2019
Monitoring period number and duration of this monitoring period	Third monitoring period 01/04/2014 – 31/12/2015 (639 days)
Version number of the monitoring report to which this report applies	06
Crediting period of the project activity corresponding to this monitoring period	30/05/2010 – 29/05/2020 (Fixed)
Project participants	<p>Rwanda: Rwanda Energy Group Ltd (REG Ltd);</p> <p>Netherlands: Netherlands' Ministry of Infrastructure and the Environment (IenM);</p> <p>Germany: BASF SE; KfW;</p> <p>Austria: Kommunalkredit Public Consulting GmbH;</p> <p>Denmark: Maersk Olie og Gas A/S; Dong Energy Salg & Service A/S; Nordjysk Elhandel A/S; Danish Ministry of Climate, Energy and Building/Danish Energy Agency; Aalborg Portland A/S;</p> <p>Sweden: Goteborg Energi AB;</p> <p>Italy: Government of Italy - Ministry for the Environment, Land and Sea;</p> <p>Belgium: Bruxelles Environnement – IBGE; Walloon Region: Walloon Air and Climate Agency;</p> <p>Spain: Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; EDP - Energias de Portugal, S.A.; Endesa Generación, S.A.; Gas Natural SDG, S.A.; Hidroeléctrica del Cantábrico, S.A.;</p> <p>Finland: Ruukki Metals Oy;</p> <p>Norway: Statoil ASA; Statkraft Carbon Invest AS;</p> <p>Switzerland: Schweizerische Rückversicherungsgesellschafts AG (Swiss RE);</p> <p>Japan: Daiwa Securities Co., Ltd.; Fujifilm Corporation; Idemitsu Kosan Co., Ltd.; JX Nippon Oil & Energy</p>

	<p>Corporation; The Okinawa Electric Power Corporation, Inc.;</p> <p>Luxembourg: Ministry of Sustainable Development and Infrastructure</p> <p>Bilateral and Multilateral Funds: International Bank for Reconstruction and Development (IBRD) as Trustee of the Community Development Carbon Fund (CDCF)</p>
Host Party	Rwanda
Applied methodologies and standardized baselines	AMS-II.J. ver. 7 - Demand-side activities for efficient lighting technologies
Mandatory sectoral scopes linked to the applied methodologies	Sectoral Scope 3: Energy demand
Conditional sectoral scope(s) linked to the applied methodologies	Not applicable
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	20,949
Certified amount of GHG emission reductions or GHG removals for this monitoring period	26,237
Name and UNFCCC reference number of the DOE	<p>AENOR INTERNACIONAL S.A.U</p> <p>UNFCCC ref. no: E-0021</p>
Name, position and signature of the approver of the verification and certification report	 <p>José Luis Fuentes</p> <p>Climate Change Manager</p>

SECTION A. Executive summary

Brief Summary

AENOR Internacional S.A.U (AENOR) has performed the third verification of the emission reduction of the project “Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project” (Registration Ref. N° 3404) from 01/04/2014 – 31/12/2015.

The purpose of the Rwanda Electrogaz CFL Distribution Project is to expand the use of high-efficiency lighting technology in Rwanda’s residential sector through the distribution of high-quality Compact Fluorescent Lamps.

The project activity, implemented by the national public electricity utility Rwanda Energy Group, Ltd (REG Ltd), is designed with two components:

- Component 1: Existing grid-connected customers have the opportunity to exchange incandescent lamps of a range of 25 to 100 watts for high-quality self-ballasted compact fluorescent lamps (CFLs) of up to 20 Watts.
- Component 2: As part of the national electrification program, which aims to increase the grid-connected rate up to 36% by 2020, newly connected REG customers receive a capped number of CFLs with their new electricity meter at the time of the connection. CFLs of 15 and 20 Watts were distributed.

The CFL distribution project is implemented through 4 phases starting mid-2007. Distribution of 4 phases was completed as of July 2015, with distribution of nearly 700,000 lamps.

Regarding the current monitoring period, as stated in the final MR /7/, only the emission reductions resulted from phase 4 CFLs distributed after December 31, 2011 are considered and claimed.

Scope of the Verification

The verification, as an independent and objective review, shall assess and verify that the implementation of the project activity and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board.

The verification shall:

1. Ensure that the project activity has been implemented and operated as per the revised PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place. It is, therefore, necessary to:
 - Interview relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan.
 - Check the monitoring equipment, including calibration performance and observations of monitoring practices, against the requirements of the revised PDD and the selected methodology.
 - Check that the manual operating provisions are duly followed (processes, routines, instructions, forms and the like).
2. Ensure that the monitoring report and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements. It is, therefore, necessary to:
 - Review relevant documentation and conduct an on-site visit.
 - Review data and information presented to verify their completeness.
 - Review indicators that must be addressed in the monitoring plan.

- Review the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.
3. Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology, carrying out:
- A review of information flows for generating, aggregating and reporting the monitoring parameters.
 - A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources.
 - A review of calculations and assumptions made in determining GHG data and emission reductions.
 - A review of the project documentation provided by the project participant to check that it is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report submitted to the DOE. Qualitative information comprises information on internal management controls, calculation procedures, and procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.
4. Evaluate the data recorded and stored as per the monitoring methodology, carrying out:
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.
 - An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
5. Identify and inform the project participant of any concerns related to the project's activity and operation conformance with the revised project design document. The project participant shall address the concerns and supply additional relevant information.
6. Provide a verification report to the project participant, the Parties involved and the CDM Executive Board. The report shall be made publicly available.

The verification is not meant to provide any consultancy services to the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring report.

AENOR, based on the Specific Instruction for the Validation, verification and certification of clean development mechanism (CDM) project activities (IE/DTC/039), /1/ which is in turn based on the CDM Validation and Verification Standard for project activities version 01.0 (VVS) /2/, has used a risk-based approach in the verification, focusing on the identification of significant risks for the generation of CERs and verifying the mitigation measures for these issues.

Verification Process and Conclusion

The verification was performed through means of the following the requirements of validation and verification standard, the applied methodology AMS-II.J /3/, and relevant CDM rules. The process of the verification includes:

- I. A desk review of the monitoring report and all support documents.
- II. Follow-up interviews and site inspection.
- III. The resolution of outstanding issues and the issuance of the verification report and statement.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records.
- The calibration and maintenance records for the monitoring
- The management systems to support the project operation and monitoring.

The project is implemented in accordance with the revised Project Design Document and the approved Monitoring Plan. The monitoring system is in place and the emission reductions are calculated without material misstatements, based on the approved methodology AMS-II.J. version 07. Therefore, in AENOR's opinion, the GHG emissions reductions reported for the project in the latest version of the monitoring report are correct.

All Corrective Action Requests (CAR) and Clarification Actions (CL) have been checked by the verification team and have been adequately resolved.

AENOR is able to certify that the emissions reductions from the "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project" from 01/04/2014 – 31/12/2015 amount to 26,237 tonnes of CO₂ equivalent.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	IR	Pellitero Martínez	Marcelino	AENOR	X			X
2.	Verifier	IR	Medrano Gutierrez	Alfonso	AENOR	X	X	X	X
3.	Verifier	IR	García Madero	M ^a Mercedes	AENOR	X	X	X	X

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Gonzales Toledo	Richard Gonzales	AENOR Peru
2.	Approver	IR	Fuentes Perez	Jose Luis	AENOR

SECTION C. Application of materiality

AENOR verification team has considered the CDM requirements on materiality concept according to:

- Decision 9/CMP.7 Materiality standard under the clean development mechanism.
- CDM Validation and Verification Standard (VVS) version 01.0
- Guideline: Application of materiality in verifications version 02.0 /4/.

“Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project” is a small scale CDM project activity achieving total emission reductions < 30,000 tons of CO₂e per year; as such, a 5 per cent materiality threshold is applied for this verification as per CDM in accordance with paragraph 329 (d) which states: “5 per cent of the emission reductions or removals for small-scale project activities other than registered CDM project activities covered under subparagraph (e) below”.

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human error in the quantification of emissions	Low	Data used for the emissions reduction calculation are collected through automated systems so the risk for human error is reduced. Calculation spreadsheets are used to determine the emissions reductions.	<p>Verification has been focused on the assessment of:</p> <ul style="list-style-type: none"> • Quality of raw data and procedures for its collection. • Calculation spreadsheets. • Controls established to detect and correct any error or omission in monitoring parameters. • Monitoring procedures. • Reliability of internal and external data. • Internal data quality control for monitored parameters and metering systems. <p>The verification plan included a desk review, on-site</p>

				inspection and interviews with relevant personnel.
2	Undue reliance on a poorly designed information system, which may have few effective quality controls	Low	According to MR there are QC/QA procedures applied for monitoring parameters and data management.	<p>Verification has been focused on the assessment of:</p> <ul style="list-style-type: none"> • Quality of raw data and procedures for its collection. • Calculation spreadsheets. • Controls established to detect and correct any error or omission in monitoring parameters. • Monitoring procedures. • Reliability of internal and external data. • Internal data quality control and implementation of internal procedures for quality management. • Sampling plan described in section E.6.3 <p>The verification plan included a desk review, on-site inspection and interviews with relevant personnel.</p> <p>Please see section D.4 for the sampling approach applied.</p>

C.2. Consideration of materiality in conducting the verification

The verification has been performed through a desk review and on-site inspection including interviews with relevant personnel.

The verification activities in which risks were assessed are the evaluations of:

- Monitoring system including calibration of scales
- Calculation spreadsheets
- Quality of raw data and procedures for its collection.
- Data flow
- Data control procedures
- Sampling plan

Some mistakes were identified and subsequently corrected. These findings are detailed in Appendix 4 and they were successfully closed. Therefore, related identified mistakes as listed in findings in Appendix 4 to this report have been determined to be immaterial. All identified inconsistencies and clarification requests have been successfully closed. Based on the assessment carried out, AENOR

confirms with a reasonable level of assurance that the claimed emission reductions are free from material errors, omissions or misstatements.

SECTION D. Means of verification

D.1. Desk/document review

The desk review involved a review of:

- Project documentation: PDD revised /5/, initial version monitoring report /6/ and final Version of monitoring report /7/.
- CDM project standard for project activities version 01.0 /8/ and CDM project cycle procedure for project activities version 01.0 /9/.
- CDM Monitoring report form and the instruction for filling out the MR.
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board.
- The monitoring plan and the applied monitoring methodology, paying close attention to the frequency of measurements, the quality of metering equipment and the quality assurance and quality control procedures.
- The data and information presented to verify their completeness, including the monitoring report and the measuring records of the different monitored parameters.
- The influence of data management and the quality assurance and quality control system on the generation and reporting of emission reductions.
- A comparison of the actual CERs claimed in the monitoring period with the estimate in the PDD, and explanation of any significant increase.

A complete list of all documents reviewed is attached in Appendix 3 of this report.

D.2. On-site inspection

According to paragraph 342 VVS for CDM Project Activities version 01.0, it is mandatory for the DOE to conduct an on-site inspection at verification for the registered CDM project activity if:

1. It is the first verification for the DOE with regard to this project activity;
2. More than three years have elapsed since the last on-site inspection conducted for verification for the project activity; or
3. The project activity has achieved more than 300,000 t CO₂ eq of GHG emission reductions or net anthropogenic GHG removals since the last verification when an on-site inspection was conducted.

AENOR, complying with the above requirements, did not carry out an on-site visit to the project activity for the current verification process because:

1. This is the third verification process for the DOE with regard to this project activity.
2. No more than three years have elapsed since the last on-site inspection conducted for verification for the project activity. Last site inspection to the project activity was carried out from 30/03/2016 to 31/03/2016.
3. The project activity has achieved less than 300,000 t CO₂ eq of GHG emission reductions (26,237 tCO₂ eq) since the last verification when an on-site inspection was conducted.

AENOR has used the following alternative means of verification to confirm that the project complies with the CDM rules:

1. Document review, involving:
 - a. A review of the data and information presented by the PP to verify their completeness;
 - b. A review of the registered monitoring plan, the applied methodology paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
 - c. An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of GHG emission reductions or net anthropogenic GHG removals;
 - d. An assessment of the implementation and operation of the registered CDM project activity as per the revised PDD and any possible change implemented from the last on site visit.
 - e. A review of information flows for generating, aggregating and reporting the monitoring parameters;
 - f. Cross checks between information provided in the monitoring report and data from other sources such as plant logbooks, and internal databases.
 - g. Evidence that the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the revised PDD and the applied methodology.
 - h. A review of calculations and assumptions made in determining the GHG data and GHG emission reductions or net anthropogenic GHG removals.
 - i. An identification of quality control and quality assurance procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.

2. Skype and telephone interviews (see section D.3 below) with relevant personnel to determine:
 - a. The project activity is operating as per the revised PDD and the project boundaries remain the same.
 - b. whether the operational and data collection procedures are implemented in accordance with the registered monitoring plan;
 - c. the sampling plan stated in the revised PDD was properly implemented.
 - d. the ERs calculation is correct according to the evidence provided and the applied methodology.

Duration of on-site inspection: N/A				
No.	Activity performed on-site	Site location	Date	Team member
N/A	N/A	N/A	N/A	N/A

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Xiaoyu	Chang	Climate and Carbon Finance Unit at The World Bank	--	<p>Verification of controls established to detect and correct any error or omission in monitoring parameters.</p> <p>Verification of different data of the PDD and monitoring report.</p> <p>Verification of estimates and assumptions for determining GHG data.</p> <p>Sampling plan implementation</p> <p>Calculation of sample size.</p> <p>Project implementation as per the revised PDD</p>	<p>Alfonso Medrano Gutierrez</p> <p>Mercedes García Madero</p>
2	Mugeraneza	Viator	REG Ltd Project coordinator	--	<p>Flows for generating, aggregating and reporting the monitoring parameters.</p> <p>Crosscheck between information provided in the monitoring report and data from the monitoring system, log books, purchase records, Handwritten records.</p> <p>Testing of monitoring equipment and observation of monitoring practices.</p> <p>Running of specific checks and trials on data sources and data management practices where non conformities are detected.</p> <p>Clarifications related to monitoring procedures.</p> <p>Sufficiency of monitoring plan.</p> <p>Reliability of internal and external data.</p> <p>Internal data quality control.</p> <p>Implementation of ex-post installation surveys</p>	<p>Alfonso Medrano Gutierrez</p> <p>Mercedes García Madero</p>

D.4. Sampling approach

AENOR followed paragraph 21 to 27 of the Standard for sampling and surveys for CDM project activities and programme of activities (ver. 04.1) (the version in force at the time of the registration of the revised PDD) /10/ in order to verify whether the sample size and sampling method proposed by the PP was adequate to achieve the minimum confidence/precision requirements.

AENOR confirms that the selected samples by the project proponent for their monitoring surveys are representative of the population and that the required confidence and precision have been met, and

are also applicable for this monitoring period. This is in line with the requirement of paragraph 21-22 of the Standard for sampling and surveys for CDM project activities and programme of activities (ver. 04.1)

In line with the requirements of paragraph 24 of the above mentioned Standard for sampling, AENOR has designed an acceptance sampling, and verified a total of 40 samples of the documented records /11/ of customer households and found PPs survey records to be acceptable within the limits required as per paragraph 24 to 26 of the sampling standard as described below. AENOR's sample size was deemed to be adequate due to the following reasons:

- AENOR selected an acceptable quality level at 1% (following the guidance of the Standard for sampling and surveys for CDM project activities and programme of activities (ver. 04.1). In line with paragraph 25 of the sampling standard, the maximum discrepancy (unacceptable quality level) was fixed at 20% of the determined sample size.
- The maximum error associated with the determination indicated in paragraph above shall remain at levels indicated below:
 - A 10% chance that the DOE will wrongly reject the PPs records (producer's risk).
 - A 10% chance that the DOE will wrongly accept the PPs records (consumer's risk).

Using the previous provisions, AENOR determined the size of the sample for the verification of the survey as 40 and an acceptance number (maximum discrepancies admitted) of 1 for the survey.

This total sample size of 40 was obtained by means of manual calculation and following the Guideline: Sampling and surveys for CDM project activities and programmes of activities.

AENOR's audit team reviewed the reports of the surveys and the registers of the sampled households and revealed no discrepancies with the PP records included in the monitoring survey, which was well within the pre-set limit of error. During this monitoring period the result of the same surveys was used for the calculation of ERs in accordance with the applied methodology and registered monitoring plan. For all these reasons, and based on the results of the previous verification, AENOR confirms that the sampling size and the method used were in line with the requirements of the Standard for sampling and surveys for CDM project activities and programme of activities (ver. 04.1) (the version in force at the time of the site visit) which were also in line with the current version of that standard (version 07.0).

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form		CAR 1	
Compliance of the project implementation and operation with the registered PDD	CL 1 CL 2 CL 3		
Post-registration changes			
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines			
Compliance of monitoring activities with the registered monitoring plan		CAR 2 CAR 3	
Compliance with the calibration frequency requirements for measuring instruments			
Assessment of data and calculation of emission reductions or net removals			

Assessment of reported sustainable development co-benefits			
Global stakeholder consultation			
Others (please specify)			
Total	3	3	

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	<p>The compliance of the monitoring report with the monitoring report form was verified through the desk-review of last version of monitoring report and the latest version of applicable monitoring report form, CDM rules and references and supported documents provided by the project participants.</p> <p>In AENOR's opinion the monitoring report was completed using the last version of the applicable monitoring report form and has followed the instructions for filling attached at the end of the form.</p>
Findings	<p>CAR 1 - The monitoring report has not been completed according to the version in force of "Instructions for filling out the monitoring report form attached to the monitoring report form":</p> <ul style="list-style-type: none"> - Section A.5: The end date of the crediting period is not stated. - Section B.2: The reference numbers of the post-registration changes approved are not stated. - Section D.2: Only parameters that were monitored during this monitoring period should be included.)
Conclusion	<p>It is AENOR opinion that the final version of the monitoring report was completed using the latest version of the applicable monitoring report form and the instructions for filling it were properly followed by the PP.</p>

E.2. Remaining forward action requests from validation and/or previous verifications

Not applicable.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	<p>The compliance of the project implementation with the revised project design document was verified through interviews with the PPs and desk-review of documents provided by them (all registered documents are listed in Appendix 3).</p> <p>The project is implemented in 4 phases, all of them completed as of the completion of this monitoring report. The end date of distribution of lamps was July 2015.</p> <p>After crosschecking the available information, the audit team found that the project was operating normally during the monitoring period, according to the requirements established in the revised PDD.</p> <p>After crosschecking the available information, the audit team found that the project was implemented according to the requirements established in the revised PDD.</p>
Findings	<p>The project was implemented in 4 phases, all of them completed at the end of the current monitoring period</p>

The implementation and operation status of the project has been verified as follows:

Phase	Number of CFLs distributed/Installed					Timeline of distribution	
	Comp 1 20W	Comp 1 15W	Comp 2 20W	Comp 2 15W	Total	PDD	Actual end date
1	43,119	0	0	0	43,119	Aug-07- Sept-07	Dec-07
2	132,351	0	0	0	132,351	Sept-08- Mar-09	Jun-09
3	22,573	66,366	70,990	25,524	185,453	Mid 09	Dec-10
4	0	0	190,525	129,222	319,747	Mid 10 – early 11	Jul-15

As stated in the final MR, only phase 4 distribution is considered in the current monitoring period. During phase 4 319,747 CFLs have been distributed over the project period (July 2010 to July 2015). However, as a conservative approach, only lamps from Phase 4 that are still within the rated lifetime of 4.7 years by the end of each reporting year are considered by the PPs for ER calculation. Moreover, CFLs distributed from July 2010 – December 2011 have been totally removed from ER calculation by the PPs. This approach is deemed conservative thus accepted by the verification team of AENOR.

In addition, the PPs, has provided to the DOE with the monthly distribution during phase 4 /21/ and these figures have been checked in the ER calculation spreadsheet /12/ and found to be the same.

Period	15W		20W	
	Instantaneous	Cumulative	Instantaneous	Cumulative
Jan'12 - Mar'14	107.919	107.919	178.720	178.720
Apr'14	1.715	109.634	3.929	182.649
May'14	200	109.834	264	182.913
Jun'14	103	109.937	309	183.222
Jul'14	27	109.964	81	183.303
Aug'14	456	110.420	393	183.696
Sep'14	30	110.450	90	183.786
Oct'14	81	110.531	243	184.029
Nov'14	47	110.578	141	184.170
Dec'14	39	110.617	93	184.263
Jan'15	1	110.618	3	184.266
Feb'15	2	110.620	6	184.272
Mar'15	0	110.620	0	184.272
Apr'15	0	110.620	0	184.272
May'15	0	110.620	0	184.272
Jun'15	0	110.620	0	184.272
Jul'15	1	110.621	3	184.275
Aug'15	0	110.621	0	184.275
Sep'15	0	110.621	0	184.275
Oct'15	0	110.621	0	184.275
Nov'15	0	110.621	0	184.275
Dec'15	0	110.621	0	184.275

	<p>CL 1 - Distribution database shall be provided to the DOE team.</p> <p>CL 2 - The report and the spreadsheet with the results obtained from the 4th ex-post monitoring survey: September 2013, shall be provided to the DOE Team.</p> <p>CL 3 - Evidence of the sampling design and sample size calculation shall be provided to the DOE team.</p>
Conclusion	<p>According to paragraph 357 of VVS for project activities version 01.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • The implementation status and equipment installation of the Project are consistent with the revised PDD. • The actual operation of the Project is as per the revised PDD. • Information (data and variables) provided in the monitoring report is in accordance with that stated in the revised PDD.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

Not applicable.

E.4.2. Corrections

Post registration changes including corrections were approved by the EB on 02/12/2016. Reference: PRC-3404-002: <https://cdm.unfccc.int/PRCContainer/DB/prcp447598078/view>

E.4.3. Change to the start date of the crediting period of the project activity

Not applicable.

E.4.4. Inclusion of a monitoring plan

Not applicable.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

Post registration changes including changes from registered monitoring plan were approved by the EB on 02/12/2016. Reference: PRC-3404-002: <https://cdm.unfccc.int/PRCContainer/DB/prcp447598078/view>

E.4.6. Changes to the project design

Not applicable.

E.4.7. Changes specific to afforestation and reforestation project activities

Not applicable.

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	The compliance of monitoring plan with the monitoring methodology was verified by reviewing whether the validated CDM project activity was in accordance with the applied methodology and if any other monitoring aspect of the project activity that is not specified in the methodology was established. AENOR was able to review different records and whether the monitoring methodology has been adequately considered and documented.
Findings	No finding was raised regarding this issue.
Conclusion	<p>The verification team reviewed whether the monitoring plan of the revised PDD was in accordance with the applied methodology and any other monitoring aspect of the project activity that is not specified in the methodology was established.</p> <p>The verification team confirms that the monitoring plan of the revised PDD is in accordance with the applied methodology AMS-II.J. ver. 7 - Demand-side activities for efficient lighting technologies based on the following reasons:</p> <ul style="list-style-type: none"> • During the desk review monitoring parameters included in the applied methodology were compared with the ones included in the Monitoring plan of the revised PDD, and they were found consistent. • The monitoring plan perfectly fulfils the criteria stated in the monitoring methodology. • No other relevant aspects for monitoring not included in the methodology were identified. <p>Therefore, AENOR, according to paragraph 360 of the VVS for project activities version 01.0, confirms that the monitoring plan is in compliance with the approved methodology applied by the CDM project activity.</p>

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	<p>Data and parameters fixed ex ante were verified through desk-review of monitoring report, revised PDD and applied methodology. The list of the parameters fixed ex ante verified is:</p> <ul style="list-style-type: none"> - $EF_{CO_2,ELEC,i}$: Emission factor for the national electricity grid. Value applied: 0.6540 kg CO_{2e}/kWh - TD_y: Average annual technical grid losses in year y Value applied: 10% - NTG: Net-to-gross adjustment factor. Value applied: 0.95 - O_i: Average daily operating hours of the lighting devices replaced by the group of "i" lighting devices. Value applied: 3.5 hours - L_i: Equipment lifetime. Value applied: 6,000 hours - X_i: Number of operating hours per year for equipment type i Value applied: 1,277.5 hours - R_i: Percentage of lamps of type i operating at the rated lifetime. Value applied: 50% - $P_{i,BL}$: Power of the incandescent lamps in the baseline scenario. Value applied: 83.3 Watt
Findings	No finding was raised regarding this issue

Conclusion	<p>Data parameters fixed at validation, used for calculating the emission reduction, are in accordance with revised PDD and the applied methodology.</p> <p>All data sources and assumptions are appropriate, and calculations are correct as applicable to the proposed CDM project activity.</p>
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E.6.2. Data and parameters monitored

Means of verification	The audit team carried out a review of information flows for generating, aggregating and reporting the monitoring parameters to assess a completeness of monitoring in line with the monitoring plan and the applied methodology, including:
	<ul style="list-style-type: none">- The measurement/determination method used.- Significant inaccuracies occurred in case of measured or estimated values of some parameters.- Measuring, reading and/or recording frequency.- QA/QC procedures applied to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
	The monitoring system and all applied procedures are in compliance with the monitoring plan and the applied methodology AMS-II.J version 07 based on the information included in the final monitoring report and the ERs spreadsheet /12/.
	The list of all parameters monitored, and the means of verification used are detailed as follows:
	<ul style="list-style-type: none">- Customer information
	<ul style="list-style-type: none">- Monitoring: Once at bulb distribution. The implementer of the project activity, conducts monitoring of the lamp distribution data through its antennas and stations or through private retailers; and collection, storage and destruction of ICLs. Customer identification (REG customer ID, which allows for unambiguous identification of the recipient of the equipment) is registered in a database. Phase 1: Data entered in a handwritten register and then entered into an Excel database. Phase 2, 3 and 4: Data entered in an Excel database and in-house software. The Excel database serves as the reference for data recording.
	<ul style="list-style-type: none">- Means of verification: AENOR verified 4th distribution database register /13/, handwritten registers and personal information from customers. AENOR confirms that this parameter has been monitored according to the monitoring plan stated in the revised PDD and no inconsistencies have been found between the information verified and the distribution database.
	<ul style="list-style-type: none">- Distribution date:
	<ul style="list-style-type: none">- Monitoring: Once at bulb distribution
	<ul style="list-style-type: none">- Means of verification: AENOR verified the actual figures available against the database register /13/21/. AENOR confirms that this parameter has been monitored according to the monitoring plan stated in the revised PDD and no inconsistencies have been found in the documentation provided.

<ul style="list-style-type: none">- Q_{BL,i} : Number (quantity) of pieces of incandescent lamps (ICLs) of type i (component 1) under the project			
<ul style="list-style-type: none">- Monitoring: Once at bulb distribution. The number of pieces distributed is:			
Phase 1	Phase 2	Phase 3	Phase 4
40,328	132,042	90,696	0

<ul style="list-style-type: none">- Means of verification: As stated in the final MR, only phase 4 distribution is considered in the current monitoring period. Phase 4 does not include
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Component 1 CFLs. Thus, this parameter is not applicable to this monitoring period.

- **$Q_{PJ,i}$: Number (quantity) of pieces of CFLs of type i distributed under the project.**

- Monitoring: Once at bulb distribution. The number of pieces distributed is:

Phase	1	2	3	4
15 W	-	-	56,726	129,222
20 W	40,328	132,042	22,573	190,525

- Means of verification: AENOR verified the actual figures against the database register. Handwritten registers and personal information from customers were checked during on site visit, but they are also valid for this verification process, since the data is the same since end date of distribution is July 2015. AENOR confirms that this parameter has been monitored according to the monitoring plan stated in the revised PDD and no inconsistencies have been found in the documentation provided.

As stated in the final MR, only phase 4 distribution is considered in the current monitoring period. During phase 4, 319,747 Component 2 CFLs have been distributed over the project period (July 2010 to July 2015). Phase 4 does not include Component 1 CFLs.

- **$P_{i,BL}$: Power of the incandescent lamps exchanged (for the component 1 only)**

- Monitoring: At bulb distribution. The power of the f the incandescent lamps exchanged are 25 W, 40 W, 60 W and 75 W.
- Means of verification: As stated in the final MR, only phase 4 distribution is considered in the current monitoring period. Phase 4 does not include Component 1 CFLs. Thus, this parameter is not applicable to this monitoring period.

- **$P_{i,PJ}$ Rated power of the project CFLs of the group of “ i ” lighting devices, i**

- Monitoring: At bulb distribution and ex post monitoring surveys. The power of the project CFLs is 15 W and 20 W.
- Means of verification: AENOR verified the actual figures against the database register. As in the other parameters, data verified during previous verification is valid for this verification process, since the end date of distribution was July 2015. AENOR confirms that this parameter has been monitored according to the monitoring plan stated in the revised PDD and no inconsistencies have been found.

- **$LFR_{i,y}$: Lamp Failure Rate for equipment type i in year y (fraction)**

	<ul style="list-style-type: none"> - Monitoring: Ex-post surveys are conducted: once in the first year of installation, and once every 3 years, or once for every 30% of elapsed rated lifetime (whichever is shorter) <ul style="list-style-type: none"> o 1st monitoring survey: April, 2008 for phase 1 o 2nd monitoring survey: October, 2009 for phase 1 and phase 2 o 3rd monitoring survey: June, 2011 for phase 1, phase 2 and phase 3 o 4th monitoring survey: September, 2013 for phase 1, phase 2 and phase 3 o 5th monitoring survey: November, 2015 for phase 3 and phase 4 <p>AENOR verified that the Lamp failure rate for Phase 4 is calculated according to the procedures stated in the revised PDD, where each batch refers to each phase, and the applied methodology, based on 5th ex post monitoring survey made in November 2015. In addition, AENOR considers that the use of only one average LFR based on all distributed CFLs regardless the year of distribution as reasonable and conservative (see section E.6.3 below).</p> <ul style="list-style-type: none"> - Means of verification: Means of verification of this parameter are detailed in section E.6.3 and section D.4 of this verification report. <p>All the parameters for achieving emission reduction calculation by the prescribed equations for baseline emissions, project emissions, leakage and emissions reduction have been listed in section D. of the Monitoring report in a complete manner.</p> <p>AENOR team verified the information flow (from data generation, aggregation, to recording, calculation and reporting) for these parameters including the values in the monitoring reports.</p>
Findings	<p>As stated in the final MR, only phase 4 distribution is considered in the current monitoring period.</p> <p>No finding has been raised.</p>
Conclusion	<p>According to paragraphs 363 and 364 of VVS for project activities version 01.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • The monitoring has been carried out in accordance with the monitoring plan in the revised PDD. • All parameters required by the monitoring plan have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements. • The registered monitoring plan has been properly implemented and followed by the project participants; • All parameters stated in the registered monitoring plan and relevant Board decisions have been monitored and updated as applicable • The equipment used for monitoring is controlled and calibrated in accordance with the registered monitoring plan, the applied methodology and the national standard. • Monitoring results are consistently recorded as per the approved frequency; • Quality assurance and quality control procedures have been applied in accordance with the registered monitoring plan.

E.6.3. Implementation of sampling plan

Means of verification	<p>According to the applied methodology and the registered PDD, the following parameters were determined using sampling and survey approach:</p> <ul style="list-style-type: none"> - N_{sample,s}: Number of sampled CFLs during the post installation survey.
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- **N_{OK,s}**: Number of sampled CFLs which are functional during the post installation surveys
- **LFR_{i,y}**: Lamp Failure Rate for equipment type i in year y (fraction)

The sampling objective was to determine the ex-post Lamp Failure Rate (LFR) for adjustment of the net electricity savings and emission reduction calculations. As per AMS-II.J the sampling size had to be determined by minimum 90% confidence interval and 10% maximum error margin. According to the sampling plan described in B.7.2 of the approved revised PDD, the sample size for each Phase will be at least 271 CFLs to be surveyed and the number of lamps that still in operation will be counted. AENOR was able to reproduce the calculation obtaining the same results.

Furthermore, AENOR verified that the target population is the distributed CFLs under Phase 3 through Phase 4. The sampling method was applied to each Phase separately. The number of households is determined by dividing the sample size by the number of CFLs distributed per household in each phase.

The collected data are described in the corresponding survey reports and related documents provided to the verification team /14/15/16/17/18/19/20/ and are summarized in the table below. The verification team checked the figures during the on-site visit by means of the review of the central database, household visits, and the handwritten records.

Survey	Sampling Frame	N _{OK,s}	N _{sample,s}	LFR _{i,y}
5 th Survey November 2015	Phase 3 CFLs (component 1)	140	280	0.500
	Phase 3 CFLs (component 2)	159	279	0.430
	Phase 4 CFLs (component 2)	248	280	0.114

AENOR considers the procedure for sampling to be accurate, conservative and following the sampling plan described in B.7.2 of the approved revised PDD and the EB guidance for sampling that were in force at the time when the surveys were designed and carried out. AENOR was able to reproduce the calculations of the sample size, obtaining the same results.

The methodology requires confidence / precision of 90/10 for this parameter. The project proponent calculated the reliability of the different surveys to check whether the requirements are met.

The number of samples for the survey relevant for this monitoring report is presented in the below table:

Survey #	Sampling Frame	Required Sample Size (#CFLs)	Final Sample Size (#CFLs)	Number of CFLs per household	Number of households surveyed	Number of clusters (branches surveyed)
November 2015	Phase 3 CFLs (component 1)	271	280	4	70	10
	Phase 3 CFLs (component 2)	271	280	4	70	10
	Phase 4 CFLs (component 2)	271	280	4	70	10

Survey #	Sampling Frame	N _{OK,s}	N _{sample,s}	LFR _{i,y}
November 2015	Phase 3 CFLs (component 1)	140	280	0.500
	Phase 3 CFLs (component 2)	159	279	0.430
	Phase 4 CFLs	248	280	0.114

The actual achieved confidence / precision of 3.13% for Phase 4 CFLs obtained by AENOR (when reproducing the calculations) was the same than the indicated by the project proponent for the 5th monitoring survey in the Absolute precision Report /17/. Therefore, AENOR confirms that this requirement has been met.

AENOR verified the result of the calculation of confidence/precision following the Guideline: Sampling and surveys for CDM project activities and programmes of activities. As in the case of the calculation of the sample number, the reliability has been calculated taking into account the “absolute” 10% maximum error margin. This interpretation of the statistical calculation is allowed by paragraph 11 of the Standard for sampling and surveys for CDM project activities.

Findings

As stated in the final MR, only phase 4 distribution is considered in the current monitoring period, therefore only survey results for Phase 4 are presented since results for Phase 3 are not relevant for this monitoring period which is deemed reasonable, thus accepted by the verification team of AENOR.

Unlike to the initial phases (1 to 3) the phase 4 distribution took a longer duration (2010 – 2015) due to issues in tendering and supply of CFLs. Accordingly, the 5th ex-post installation survey was conducted after the end of phase 4 distributions. The applicability of survey results for phase 4 distributions is detailed below.

The distribution of CFLs during Phase 4 consolidated on yearly basis /21/ is provided below:

Year	Total CFLs distributed	Percentage (%)
2015	16	0.00%
2014	24,485	7.66%
2013	200,595	62.74%
2012	69,800	21.83%
2011	16,629	5.20%
2010	8,222	2.57%
Total	319,747	100.00%

From the above table, it can be inferred that around 92% of CFLs were distributed during years 2012, 2013 and 2014 and the major distribution carried out was in 2013 (62,7%). Therefore, it is justified to apply one average lamp failure rate from the 5th ex-post survey for all CFLs distributed during the period 2012 - 2015. Since the CFLs distributed in year 2010 and 2011 are at the end of their lifetime, all these CFLs are considered as failed by the PPs and have been removed from the CER calculation as a conservative measure.

	<p>AENOR considers that the use of only one average LFR based on all distributed CFLs regardless the year of distribution is reasonable and conservative due to the following:</p> <ul style="list-style-type: none"> • According to the procedures stated in the revised PDD, the sampling is implemented for each Phase (every phase is a batch) separately. • The amount of CFLs distributed in 2014 and 2015 is small (lower than 8%) and are less than one year old. Given the small quantity, they cannot significantly impact the sample survey results. In actual, it is reasonable to consider that the lamp failure rate of older CFLs from 2012 and 2013 (being 84% of total) is applied for these newly distributed CFLs. Therefore, the approach is conservative, thus accepted by the verification team of AENOR. • CFLs distributed in 2012 and 2013 contribute to around 84% of the total distribution. So it can be appraised that the survey results are representative of these number of CFLs. These CFLs are only 2-3 years old and the Lamp Failure Rate (LFR_{i,y}) of 0.114 as per survey result seems justified for these CFLs. • Though some of the CFLs distributed from July 2010 – December 2011 may be in operation in actual condition after their expected lifetime, they have been totally removed from ER calculation. Therefore, the approach is conservative, thus accepted by the verification team of AENOR. <p>CAR 2 - Calculation of LFR_{i,y} = 0.375 is not traceable in the ERs spreadsheet. Formula used to calculate it is not included in the ERs spreadsheet.</p> <p>CAR 3.- The sample survey done for phase 3 in Sep 2013 has been used as Lamp failure rate of phase 4 CFLs which does not comply with the revised sampling plan and AMS.II.J version 7.</p>
Conclusion	<p>AENOR confirms that the sampling & survey method used for monitoring complies sampling plan described in B.7.2 of the approved revised PDD, with the procedures stated in the applied methodology, and it is also in line with the Standard for Sampling and surveys for CDM project activities and programme of activities. AENOR confirms that the sample sizes have been properly calculated, the samples were randomly selected to be representative of the population, and the required confidence/precision was properly met.</p>

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	Not applicable since monitoring was carried out by sampling approach, and there is no equipment to be calibrated in the project activity according to the revised PDD.
Findings	N/A
Conclusion	N/A

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>According to the revised PDD and as per AMS-II.J (version 7), the emissions reduction generated by both components of the project activity in year y is calculated directly as follows:</p> $ER_y = NES_y * EF_{CO_2, ELEC, y}$ <p>Where:</p>
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- $EF_{CO_2,ELEC,y}$ = Emission factor in year y calculated in accordance with the provisions in AMS I.D (tCO₂/MWh)
- ER_y = Emission reductions in year y (tCO_{2e})

$$NES_y = \sum Q_{PJ,i} * (1 - LFR_{i,y}) * ES_i * NTG / (1 - TD_y)$$

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

Where:

- NES_y = Net electricity saved in year y (kWh)
- $Q_{PJ,i}$ = Number (quantity) of pieces of equipment of type i distributed under the project activity (units)
- i = Counter for equipment type
- 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_y = Average annual technical losses (transmission and distribution) in year y
- NTG = Net-to-gross adjustment factor, a default value of 0.95 to be used unless a more appropriate value based on a lighting use survey from the same region and not older than 2 years is available
- $P_{i,BL}$ = Rated power of the baseline lighting devices of the group of "i" lighting devices (Watts) or 75W if the baseline lighting device is a 100W ICL and the project lighting device a 20W CFL
- $P_{i,PJ}$ = Rated power of the project lighting devices of the group of "i" lighting devices (Watts)
- O_i = Average daily operating hours of the lighting devices replaced by the group of "i" lighting devices

The Lamp Failure Rate (LFR_y), the % of lamps that have failed, is calculated based on the results of the ex-post surveys as follows: $LFR_y = 1 - (N_{OK,x} / N_{Sample,s})$

The ERs achieved by the project during the current monitoring period is summarized in the table below:

	April-Dec 2014	2015	Total
<i>Energy savings (MWh)</i>	17,177	22,955	40,132
ERs	11,229	15,008	26,237

AENOR has reproduced the calculation of emission reductions made by the PP for both components in the ERs spreadsheets and the same results have been obtained. Therefore, the calculation is deemed to be appropriate and consistent with the evidence provided and cross-checked.

Findings

AENOR has checked that 319,747 Phase 4 CFLs have been distributed over the project period (July 2010 to July 2015). However, as a conservative approach, only lamps are still within the rated lifetime of 4.7 years by the end of each reporting year are considered for ER calculation. Moreover, CFLs distributed from July 2010 – December 2011 have been totally removed from ER calculation by the PPs.

This results in a total 294,880 (110,617 + 184,263) lamps are considered in the ER calculation for 2014 and a total of 294,896 (110,621+184,275) lamps are considered

	<p>for ER calculation for 2015. This approach is deemed conservative thus accepted by the verification team of AENOR.</p> <p>No finding has been raised</p>
Conclusion	<p>According to paragraph 376 of VVS for project activities version 01.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> - A complete set of data for the monitoring period is available. - Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources. - Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. - There are no assumptions in emission calculations. - Appropriate emission factor, IPCC default values and other reference values have been correctly applied. - No errors, miscalculations, omissions, misstatements or incomplete information has been identified.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.8.3. Calculation of leakage GHG emissions

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	<p>The verification team has checked if the MR includes a summary table of the emission reductions calculation specifying separately:</p> <ul style="list-style-type: none"> - Total baseline emissions - Total project emissions - Total leakage - Total emission reductions. <p>The auditing team has reproduced the ERs calculation made by the PP in the spreadsheets and the same results have been obtained. Therefore, the calculation is deemed to be appropriate and consistent with the evidence provided and cross-checked by AENOR.</p>
Findings	No findings were raised regarding this issue.
Conclusion	According to paragraph 376 of VVS for project activities version 01.0, AENOR verification team confirms that:

	<ul style="list-style-type: none"> - A complete set of data for the monitoring period is available. - Information provided in the monitoring report has been cross-checked with other sources. - Calculations of baseline emissions, and project activity emissions and leakage, as appropriate, have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.
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E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	<p>The comparison of actual GHG emission reductions with estimates in revised PDD has been checked and re-calculated by the verification team.</p> <p>Based on the above assessment, the emission reduction during the monitoring period 01/04/2014 – 31/12/2015 is verified to be 26,237 tCO_{2e}. The value of estimated emission reductions during the same period, in the revised PDD is 20,949 tCO_{2e}.</p>
Findings	No CARs/CLs/FARs raised in this section.
Conclusion	<p>AENOR verification team confirms that:</p> <p>A comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the revised PDD has been provided.</p> <p>The verification team considers that the calculation of the comparison is correct.</p>

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	On the basis of the above comparison of actual values of the monitoring period with the estimations in the revised PDD the verification team has checked whether an appropriate explanation is included in the MR.
Findings	<p>This increase was mainly due to the discrepancies between the ex-ante Lamp Failure Rate (LFRy) and the ex-post LFRy. The actual LFRy is much lower than the ex-ante values used in the PDD, thus increasing the ERs claimed.</p> <p>No CARs/CLs/FARs raised in this section.</p>
Conclusion	<p>According to paragraph 269 of PS version 01.0, AENOR verification team confirms that:</p> <p>The PP has explained the cause of any increase in the actual GHG emission reductions achieved during the current monitoring period including all information that is different from that stated in the revised PDD.</p> <p>The verification team considers that the explanation is appropriate</p>

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The verification team has checked section E.4 of the MR and the ER calculation Spreadsheet.
Findings	<p>The MR in section E.4 includes a summary table of the ER breakdown which states that the GHG emission reductions have completely been generated from 1 January 2013.</p> <p>No CARs/CLs/FARs raised in this section.</p>

Conclusion	AENOR confirms the emission reductions achieved during this monitoring period were generated from 1 January 2013 onwards.
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E.9. Assessment of reported sustainable development co-benefits

Means of verification	Not applicable
Findings	Not applicable
Conclusion	Not applicable

E.10. Global stakeholder consultation

Means of verification	Not applicable
Findings	Not applicable
Conclusion	Not applicable

SECTION F. Internal quality control

Following the completion of the assessment process by the verification team, all documentation undergoes an internal quality control through a technical review before the request for Issuance of CERs is submitted. The Technical reviewer is a qualified member of AENOR, independent from the team that carried out the verification of the project activity. The technical reviewer or the team appointed for the technical review is qualified in the technical area(s) and sectoral scope(s) of the project activity.

SECTION G. Verification opinion

AENOR has performed the verification of the emission reductions of the “Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project” for the period from 01/04/2014 to 31/12/2015.

The verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, Montreal COP/MOP 1, Nairobi COP/MOP 2 as well as those defined by the CDM Executive Board.

AENOR planned and performed the verification to obtain the information, explanations and evidence that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the reporting period, prepared on the basis of both the revised monitoring plan and the final monitoring report, are fairly stated.

AENOR conducted the verification with regard to the monitoring plan included in the revised Project Design Document, and the applied methodology as registered for the project. This assessment included:

- Collection of evidence supporting the reported data
- Checking whether the provisions of the monitoring plan, were consistently and appropriately applied.

AENOR has verified whether the information included in the final monitoring report is correct and that the emissions reductions achieved have been determined correctly.

In AENOR's opinion, GHG emissions reported for the project in the final monitoring report are fairly stated.

The GHG emission reductions were calculated without material errors, omissions or misstatements in a conservative and appropriate manner according to the approved methodology “AMS-II.J. version 7 and the monitoring plan and formulae provided in the revised PDD.

SECTION H. Certification statement

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AENOR is able to certify that the emission reductions achieved by the "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project" for the period from 01/04/2014 to 31/12/2015 amount to 26,237 tCO₂.

Madrid, March 27th, 2019.



Marcelino Pellitero Martinez
Team leader



José Luis Fuentes
Authorized person

Appendix 1. Abbreviations

Abbreviations	Full texts
AENOR	AENOR Internacional S.A.U.
AMS-II.J	“Demand side activities for efficient lighting technologies” (version 07)
CAR	Corrective action request
CDM	Clean development mechanism
CDM-EB	CDM Executive Board
CER	Certified emission reduction
CL	Clarification request
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated national authority
DOE	Designated operational entity
ER	Emission reduction
FAR	Forward action request
GHG	Greenhouse gas(es)
IBRD	International Bank for Reconstruction and Development as Trustee of the Prototype Carbon Fund
IPCC	Intergovernmental Panel on Climate Change
MoV	Means of verification
MP	Monitoring Plan
MR	Monitoring report
PCP	Clean Development Mechanism Project Cycle Procedure (Version 01.0)
PDD	Project Design Document
PP	Project participants
PS	Clean Development Mechanism Project Standard (Version 01.0)
tC	Carbon tonnes
tCO ₂ eq	Carbon dioxide equivalent tonnes
UNFCCC	United Nations Framework Convention on Climate Change
VVS	CDM Validation and Verification Standard version 01.0

Appendix 2. Competence of team members and technical reviewers

Necessary skills and competences to undertake the verification are confirmed by the qualification certificate of all team involved in the process.

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project"

Madrid, 03/09/2018

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: Marcelino PELLITERO MARTÍNEZ

CDM Team Leader: Yes

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

T.A 3.1 Energy demand



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project"

Madrid, 03/04/2018

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: Mercedes GARCÍA MADERO

CDM Team Leader: Yes

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

T.A 3.1 Energy demand



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project"

Madrid, 03/04/2018

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: Alfonso MEDRANO GUTIERREZ

CDM Team Leader: Yes

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

T.A 3.1 Energy demand



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for "Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project"

Madrid, 03/09/2018

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: Richard GONZALES TOLEDO

CDM Team Leader: Yes

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

T.A 3.1 Energy demand



Jose Luis Fuentes
Climate Change Manager

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	AENOR	Specific Instruction for the Validation, verification and certification of clean development mechanism (CDM) project activities (IE/DTC/039),	--	AENOR
2	CDM-EB	CDM Validation and Verification Standard for project activities	Version 01.0	UNFCCC Website
3	CDM-EB	AMS-II.J. Demand-side activities for efficient lighting technologies	Version 07.0	UNFCCC Website
4	CDM-EB	Guideline: Application of materiality in verifications	Version 02.0	UNFCCC Website
5	PP	Rwanda Electrogaz Compact Fluorescent Lamp (CFL) distribution project PDD	Version 14	UNFCCC Website
6	PP	Monitoring report	Version 01	PP
7	PP	Monitoring Report	Version 06	PP
8	CDM-EB	CDM Project Standard for Project Activities	Version 01.0	UNFCCC Website
9	CDM-EB	CDM project cycle procedure for project activities	Version 01.0	UNFCCC Website
10	CDM-EB	Standard for sampling and surveys for CDM project activities and programme of activities	Version 04.1	UNFCCC Website
11	PP	Documented registered of sampled households	--	PP
12	PP	ERs spreadsheet	--	PP
13	PP	4 th distribution database register	--	PP
14	PP	3rd_Post_Installation_EWSA_CFLs_SurveyReport_Sept2011	September 2011	PP
15	PP	ICL_Estimation_of_Number_ThirdPartyReport_Phase1	--	PP
16	PP	ICL-Estimation 3rd Party Report Phases2&3_04.09.2013	2013	PP
17	PP	Absolute Precision Calculation-Phase 4.xls	2015	PP
18	PP	4 th ex-post Survey Database_Sep 2013	September 2013	PP

No.	Author	Title	References to the document	Provider
19	PP	5th ex-post Survey Database	November 2015-	PP
20	PP	Final CFLs Fifth Post Installation Survey Report	November 2015-	Ildephonse Niyonsenga, Consultant.
21	PP	Rwanda CFL-Database consolidation	March 2019	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	xx	Section no.	E.2	Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

Table 2. CL from this verification

CL ID	01	Section no.	E.3	Date: 03/07/2017
Description of CL				
Distribution database shall be provided to the DOE team.				
Project participant response				Date: 15/11/2017
Consolidated database for CFL distribution (Phase 4) is provided to the DOE team alongside this document.				
Documentation provided by project participant				
Phase 4 distribution Database.xls				
DOE assessment				Date: 19/02/2018
The database has been provided. Nevertheless, and inconsistency between the final number of CFLs distributed and used for the emission reduction calculation between page 5 (322,243) and page 12 (130,353 + 190,902).				
Project participant response #2				Date: 20/02/2018

A total of 319,747 CFLs have been distributed over the project period (July 2010 to July 2015). However, as a conservative approach, only lamps are still within the rated lifetime of 4.7 years by the end of each reporting year are considered for ER calculation, even though it is possible the lamp can function beyond the lifetime. For example, for ERs in 2014, only CFLs distributed after December 31, 2011 are considered for ER calculation. Similarly, for ERs in 2015, only CFLs distributed after December 31, 2011 are considered. This results in a total 294,880 (110,617 + 184,263) lamps are considered in the ER calculation for 2014 and a total 294,896 (110,621+184,275) lamps are considered for ER calculation for 2015. To avoid confusion, the actual numbers of distribution over the project period (July 2010 to July 2015) is now adopted in consistence with the figures in the distribution database. A note is also added in page 14 to clarify. The ER figures remain unchanged.

Documentation provided by project participant #2

MR - Rwanda CFL Project - 3rd Verification - Version 3 (track change).doc

Phase 4 distribution Database (updated) - 20Feb18.xls

DOE assessment #2

Date: 09/03/2018

The clarification is considered appropriate and the approach conservative, therefore, **CAR is closed.**

CL ID	02	Section no.	E.3	Date:	03/07/2017
Description of CL					
The report and the spreadsheet with the results obtained from the 4th ex-post monitoring survey: September, 2013, shall be provided to the DOE Team.					
Project participant response					Date: 15/11/2017
The survey report and the excel spreadsheet regarding the 4 th ex-post monitoring survey dated September 2013 are provided to the DOE team alongside this document.					
Documentation provided by project participant					
Final Report 4th post installation survey. doc 4th ex-post Survey Database_Sep 2013.xls					
DOE assessment					Date: 19/02/2018
Documentation is provided and no inconsistency has been found. CL is clarified.					

CL ID	03	Section no.	E.3	Date:	03/07/2017
Description of CL					
Evidence of the sampling design and sample size calculation shall be provided to the DOE team.					
Project participant response					Date: 15/11/2017
Please refer to the survey report for sampling design and sample size calculation.					
Documentation provided by project participant					
Final Report 4th post installation survey. doc					

DOE assessment	Date: 19/02/2018
The sample size for phase 3 is 30 households, 120 CFLs, and it is calculated in accordance with Standard Sampling and surveys for CDM project activities and programmes of activities version 04.1. Therefore, CL is clarified.	

Table 3. CAR from this verification

CAR ID	01	Section no.	E.1	Date: 03/07/2017
Description of CAR				
<p>The monitoring report has not been completed according to the version in force of "Instructions for filling out the monitoring report form attached to the monitoring report form"</p> <ul style="list-style-type: none"> - Section A.5: The end date of the crediting period is not stated. - Section B.2: The reference numbers of the post-registration changes approved are not stated. - Section D.2: Only parameters that were monitored during this monitoring period should be included. 				
Project participant response				Date: 15/07/2017
<p>-The end date of the crediting period is added in Section A.5 of the revised MR.</p> <p>-The reference number of the post-registration changes is added in Section B.2 of the revised MR.</p> <p>- Parameter QBL_i is provided just to include all parameters in revised PDD in the MR, However statement is added that it is not applicable for this monitoring period as there is no exchange of ICLs for phase 4 distribution. The parameter is also not involved in the ER calculation.</p>				
Documentation provided by project participant				
MR - Rwanda CFL Project - 3rd Verification (submission) Version 2.doc				
DOE assessment				Date: 16/02/2018
The monitoring has been correctly modified and currently is considered complete, therefore, CAR is closed.				

CAR ID	02	Section no.	E.7	Date: 03/07/2017
Description of CAR				
Calculation of $LFR_{i,y} = 0.375$ is not traceable in the ERs spreadsheet. Formula used to calculate it is not included in the ERs spreadsheet.				
Project participant response				Date: 06/07/2017
The calculation of $LFR_{i,y}$ is presented in the revised ER calculation spreadsheet.				
Documentation provided by project participant				
ERs Calculation_Rwanda CFL.xls				
DOE assessment				Date: 19/02/2018
The calculation spreadsheet is not consistent with the monitoring report regarding the number of CFLs from January 2015 (130,353 and 190,902 versus 120,027 and 187,446). A clarification is required to be included in the detail of the monitoring parameter.				

Project participant response #2	Date: 20/02/2018
<p>A total of 319,747 CFLs have been distributed over the project period (July 2010 to July 2015). However, as a conservative approach, only lamps are still within the rated lifetime of 4.7 years by the end of each reporting year are considered for ER calculation, even though it is possible the lamp can function beyond the lifetime. For example, for ERs in 2014, only CFLs distributed after December 31, 2011 are considered for ER calculation. Similarly, for ERs in 2015, only CFLs distributed after December 31, 2011 are considered. This results in a total 294,880 (110,617 + 184,263) lamps are considered in the ER calculation for 2014 and a total 294,896 (110,621+184,275) lamps are considered for ER calculation for 2015. To avoid confusion, the actual numbers of distribution over the project period (July 2010 to July 2015) is now adopted in consistence with the figures in the distribution database. A note is also added in page 14 to clarify. The ER figures remain unchanged.</p>	
Documentation provided by project participant #2	
MR - Rwanda CFL Project - 3 rd Verification - Version 3 (track change).doc	
DOE assessment #2	Date: 09/03/2018
The clarification is considered appropriate and the approach conservative, therefore, CAR is closed.	

CAR ID	03	Section no.	E.7	Date: 03/07/2018
Description of CAR				
The sample survey done for phase 3 in Sep 2013 has been used as Lamp failure rate of phase 4 CFLs which does not comply with the revised sampling plan and AMS.II.J version 7.				
Project participant response				Date: 12/09/2018
There is a 5th post-installation survey which was conducted in November 2015 that follows the approved post-registration changes and in particular in line with the survey requirements for LFR in the monitoring plan. Therefore, the results from the 5th survey have been included in the revised MR and ER calculation (see attached) and discarded the approach of using historical survey results as proxy.				
Documentation provided by project participant				
ERs Calculation_Rwanda CFL.xls MR - Rwanda CFL Project - 3 rd Verification - Version 6 Absolute Precision Calculation - Phase 4.xls Data for 5th post-installation survey.xls Final CFLs Fifth Post Installation Survey Report				
DOE assessment				Date: 17/09/2018
The MR and ER spreadsheet has been correctly modified and appropriate evidence has been provided, therefore, CAR is closed				

Table 4. FAR from this verification

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY

Documentation provided by project participant	
DOE assessment	Date: DD/MM/YYYY