CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title: Massive introduction of **C**ompact **F**luorescent **L**amp**s** (CFLs) to households in Ecuador
Version number: 5
Date: 30/09/2010

A.2. Description of the project activity:

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The Government of Ecuador, represented by the Ministry of Electricity and Renewable Energy is going to distribute twice 6,000,000 CFLs to households, where people live under poverty living conditions The Project area will encompass 808 urban areas and 109 rural areas countrywide. Each household will receives a maximum of four CFLs in return for the same number of currently used light bulbs. The returned active light bulbs will be destroyed directly on-site to prevent reuse and the destroyed lamps will be recycled by a recycling company. The lifetime of the distributed CFL types is at least 8,000 hours and each household will sign a contract that prohibits the passing on the CFLs and ensure the responsible use of the given CFLs. The CFLs to be used consume less electricity per lumen output compared to commonly used incandescent light bulbs. The lighting consumption amounts up to 43%[1] of the electricity consumption per household. Thereby the project activity will save the households income, increase the living standard of poverty households and reduce greenhouse gas emissions caused by energy production. The project participant will create an integral system of benefit (social lottery) for the involved project activity households. The project activity is accompanied by a media campaign to increase the public awareness of energy- efficiency actions at households. In the case the project activity is implemented successfully the project proponent is planning to expand the implementation of CFLs to other households under CDM as well.

[1] PROMEC, Consultoria en Eficiencia Energética. Proyecto "Sustitución de lámparas incandescentes por fluorescents compactas en el Sector Residencial." Anexo 7.1 Caracterización de la carga residencial de las empresas distribuidoras

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (yes/no)
Republic of Ecuador (host)	• Public Entity **Ministerio de electricidad y energia renovable** (Ministry of Electricity and Renewable Energy)	No
United Kingdom	• Private Entity **Deutsche Bank AG, London Branch**	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may no have provides its approval. At the time o requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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Ecuador

A.4.1.1. Host Party(ies):

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Republic of Ecuador

A.4.1.2. Region/State/Province etc.:

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The CFLs will be distributed in the following 21 provinces:
Azuay, Bolívar, Cañar, Carchi, Chimborazo, Cotopaxi, El Oro, Esmeraldas, Guayas, Imbabura, Loja, Los Ríos, Manabi, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Sucumbíos, Tungurahua, Zamora-Chinchipe[2]

A.4.1.3. City/Town/Community etc:

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Not applicable.

[2] Note: CFLs will be distrubted in the province Galapagos but not considered under this CDM project activity, because the households are not connected to the Interconnected National System (SNI).

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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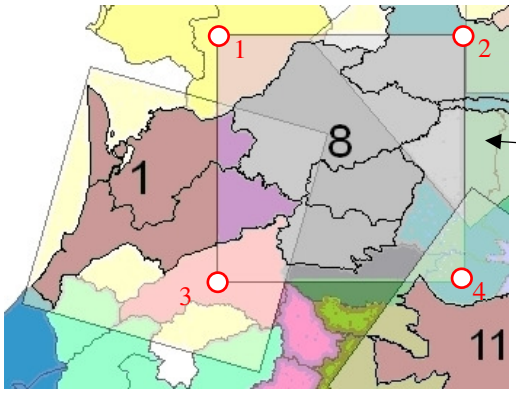
The countrywide distribution project area is divided into 808 urban and 109 rural areas.
The following information of each area is available via centralized database:

- Unique identification of each area per geographical division and number
- Geographical identification of each rectangular point by latitude and longitude
- Identification rural or urban area

According to the definition of the methodology (AM0046/Version 2) a urban area is defined as area where people live in continuously build-up areas in places with a population of 1,000 or more people and a population density of 400 or more people per km^2. A rural area is defined as area where less than 1,000 people live in one place or where the population density is less than 400 people per km^2.
The urban or rural area determination due to population density is based on the demographic information per geographical political division 2006, provided by the Instituto Geografico Militar (www.igm.gov.ec). For the project activity and according to the methodolody (AM0046/Version 2) a urban area is restricted to $4km^2$ and rural area is restricted to $3600km^2$. The "poverty level" of a political area is characterized by the NBI[3] criterias (Necesidaes Basicas Instatisfechas = Insatisfied Basic Needs). The NBI identification of the areas is provided by SIISE www.siise.gov.ec (Sistema Integrado de Indicadores Sociales del Ecuador) of the Technical Secretary of the Social Front from the Government of Ecuadorin in co-operation with INEC www.inec.gov.ec (National Institute of statistics and Census). The distinct geographical boundary of each single project area *i* can be clearly identified by GPS data. The GPS data of each single project area is indicated in an additional document, Annex 7.
All the information will be collected and available electronically and via printed journals.



Population Density by political division

Example Detail Area map

GEOGRAPHICAL DIVISION			AREA PROJECT								TOTAL DATA BY AREA PROJECT		
PROVINCE	CANTON	PARISH	Ai (project area)	GEOGRAPHICAL COORDENATES 1 LAT	LON	2 LAT	LON	3 LAT	LON	4 LAT	LON	TOTAL Number of Households by Area Project	TOTAL Number of CFLs to be distributed by area project	Density
Manabi	Pedernales	Pedernales	1	665551.072636	10029733.810800	649032.233628	9972052.549020	591350.971846	9988571.388030	607869.810859	10046252.649600	6925	27702	

Example Database detail

[3] **Definition:** Number of persons (or homes) that live under "poverty" expressed as total percentage of the population in a year. Poverty is considered to be, when a person household belongs to a home which presents persistent deficiency in the satisfaction of basic needs including household, health, education and employment.

A.4.2. Category(ies) of project activity:

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The project activity is linked to the:
Scope number 3
Sectoral scope: Energy demand
http://cdm.unfccc.int/DOE/scopes.html#3

A.4.3. Technology to be employed by the project activity:

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The project activity provides Compact fluorescent lamps (CFLs) with a rated power (P_{rated}) of 20W and a lifetime of at least 8.000 hours to the households. The project participant will provide the technical data specification of each distributed CFL type to the Designated Operational Entity (DOE). Samples of the the cargos will be taken and tested in accordance to norm IEC 60969[4] and IEC 60901[5] by an independent entity.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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Year	Annual estimation of emission reductions in tonnes of CO_2e
2011	444,255
2012	444,255
2013	444,255
2014	444,255
2015	444,255
2016	444,255
2017	444,255
2018	444,255
2019	444,255
2020	444,255
Total estimated reductions (tonnes of CO_2e)	**4,442,550**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	444,255

A.4.5. Public funding of the project activity:

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There is no public funding from Annex I Parties for this Project.

[4] IEC 60969 Self-ballasted lamps for general lighting services - Performance requirements
http://webstore.iec.ch/webstore/webstore.nsf/artnum/026814

[5] IEC 60901 Single-capped fluorescent lamps performance specifications
http://webstore.iec.ch/webstore/webstore.nsf/artnum/028244

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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- AM0046 "Distribution of efficient light bulbs to households"
  Version 2 of the approved baseline and monitoring methodology AM0046:
  http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_OSOUV88NZ5M4DKLW9XHWHHQSN1OK3G

- "Tool to calculate the emission factor for an electricity system"
  Version 2 of Annex 12 methodological tool:
  http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf

- "Tool for the demonstration and assessment of additionality"
  Version 5.02 of the methodological tool:
  http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The methodology AM0046 is applicable to project activities that enhance energy-efficient lighting in households.

- *No other CDM project that may affect the energy efficiency of lighting in households located within the total project area has been registered.*
  No other CDM project is registered that may affect the energy efficiency of lighting in households in the total project area. (refer to http://cdm.unfccc.int/Projects/projsearch.html)

- *The geographic and system boundaries for the relevant electricity grid can be clearly identified and the necessary information to calculate the grid emission factor according to the latest approved version of "Tool to calculate emission factor for an electricity system" is available.*
  The relevant electricity grid is the Interconnected National System (SNI), which represent the only interconnected grid system in Ecuador[6], thus the geographic and system boundary are clearly identified. The necessary information for the grid emission factor according to the latest approved version of "Tool to calculate emission factor for an electricity system" is available. The necessary information will be provided by CENACE.

[6] Detail information CENACE (National Center for Energy Control) website:
http://www.cenace.org.ec/index.php?option=com_phocadownload&view=sections&Itemid=50

- *Metering equipment recording the utilisation hours or the electricity consumption of each light appliance in the PSG and BSG is attached to every lamp socket or the cable leading to the lighting appliance. This means that light bulbs can be replaced by the households without inference with the metering equipment (e.g. in case of autonomous replacement)*
  The project participant chose option A "Measurement of the electricity consumption of all electric lighting appliances used by the household" (Step 5: Installation of measurement equipment AM 46) for the BSG and PSG households over the complete crediting period.
  All lighting circuits of the lighting appliances of the BSG and PSG household are disconnected from other electrical circuits and lead via cable to an electricity consumption meter (metering equipment) to continually measure the electricity consumption for lighting. The installation guarantees that that light bulbs can be replaced by the households without inference with the metering equipment

- *The project coordinator sells, at a reduced price, or donates compact fluorescent lamps (CFLs) to households within a distinct geographical area, thereby replacing less energy efficient light bulbs.*
  The project coordinator (i.e. participant) donates and distributes CFLs countrywide to households within 808 urban and 109 rural distinct geographical areas. The donated CFLs will replace the currently used low energy efficiently incandescent light bulbs.

- *The individual households that use the CFLs that are distributed or sold under the project activity are not the project participants.*
  CFLS will be distributed under the regime of the project participant Ministry of Electricity and Renewable Energy of Ecuador to individual households. Therefore the households involved in project activity are not the project participants.

- *The households return the previously used light bulbs to the project coordinator.*
  Each household involved in the project activity will return the previously active used light bulbs to the project coordinator's (i.e. participant) distribution team.

- *For each returned and functioning light bulb, the household may purchase or receive a new CFL from the project coordinator.*
  Each household under the project activity will receive a new CFL for each returned functioning light bulb from the project coordinator's (i.e. participant's) distribution team. The number of distributed CFLs per household is limited to 4 units.

- *The light bulbs returned by the households to the project coordinator should have a rated power consumption of 100 W or less.*
  The accepted returned light bulbs to the project coordinator (i.e participant) will not exceed a rated power consumption of 100W. 100 W lamps, which can not be identified were not replaced or accounted as 60 W incandescent light bulbs and no considered for the project activity.

- *The maximum number of light bulbs distributed or sold to each household should not exceed four light bulbs.*
  The number of distributed CFLs per household is limited to 4 units.

- *A light bulb that is sold or distributed to a household by the project coordinator should:*
  (a) Be more efficient (i.e. use less electricity per lumen output) than the light bulb returned by the household, and
  (b) Have the same (or a lower) lumen output as the light bulb returned by the household.

  The distributed CFLs with 20W are more efficient and use less electricity per lumen output by the household and have maximum the same lumen output as the returned 100W light bulbs.

	Power rate [W]	Luminous efficacy [lm/W]	Lumen output [lm]
Returned incandescent light bulb	100	15	1400
Distributed CFL	20	55.5	1200

  Note: Households, where the 20 W CFLs will be substituted via incandescent light bulbs with less than 100W (e.g.. 60 W), the conditions (a) and (b) above are not met, thus the households will not be considered for the project activity.
  After the distribution process information regarding number and type of the distributed and returned light bulbs of each household will be available via hardcopy form. The distribution team will note the information via standardized form for each household. The carbon copies of the household forms will be centralized kept on one point. CFLs samples of the the cargos will be taken and tested in accordance to norm IEC 60969 and IEC 60901 by an independent organisation.

- *Light bulbs are sold or distributed in the following manner:*
  (a) Distribution or sale of light bulbs and recollection of previously used light bulbs directly at each household; and/or
  (b) Distribution of light bulbs at dedicated distribution/collection points upon presentation of an invitation to participate in the project, which is sent by the project coordinator to the households.
  The project coordinator ensures that the returned light bulbs are destroyed. If the distribution mode (a) is chosen, the light bulbs are collected directly from the households and destroyed immediately. With approach (b), the light bulbs are collected at the dedicated distribution/collection points and stored for centralized or decentralized destruction.
  The contracted distribution organisation under the regime of the project participant distributes the CFLs house by house (Option a). The returned light bulbs are collected directly from each household and destroyed on-site immediately. The destroyed incandescent light bulbs will be forwarded to the project participant and afterwards to a recycling company. The distribution process and the transfer to the recycling company will be observed by an independent organisation.

- *The households are connected to a national or regional electricity grid.*
  All involved households within the project activity are connected to the national grid SNI[7].
  (Sistema Nacional Interconectado)

[7] The Interconnected National System (SNI) is the only interconnected grid system in Ecuador.
reference http://www.conelec.gov.ec/ ; http://www.cenace.org.ec ; http://www.transelectric.com.ec

- *The power rating of each type of light bulb that is distributed or sold by the project coordinator is known before the start of the project activity and the P-U characteristic curves of these light bulb types have been determined by laboratory measurements.*
  The project coordinator (i.e participant) will distribute CFLs with a power rate (P_{rated}) of 20W.. CFL Samples of the the cargos will be taken and tested in accordance to norm IEC 60969[8] and IEC 60901[9] by an independent organisation. The test results and documentation will be available as hardcopy on site. The project participant select option 1 "Installation of an electricity consumption meter" for all households for the pool of households, to measure the electricity consumption of all lighting appliances within the household (Step 5). Thus the determination of the P-U curve is not required for the calculation.

- *The project coordinator implements a social lottery system among all households included in the baseline sample group (BSG) and the project sample group (PSG) which provides a strong incentive for not leaving the sample groups, while ensuring that lottery income does not create a monetary household income that could have an impact on the household's lighting behaviour (e.g. semi-annually 3 awards providing free educational programmes could be advertised among all sample group households). The lottery should be observed by an independent non-profit organisation within the host country (e.g. the church). Lottery results need to be reported semi annually to all sample group households;*
  The project participant creates an "Incentive system for participation" (social lottery) as part of the "Citizen Participation Program CIPP" (sistema integral de beneficios[10]) for households, which are involved in the BSG and PSG. The design and execution of the incentive system participation will consider the particular conditions of the rural areas and urban areas, and the social circumstances of each area. The Incentive system for participation provides an annual budget for the households, neighborhoods and parishes, which will be affected by the monitoring process. The assigned budget for the incentive system will be used for collective interests: health, care, education, green areas and recreation measures. The budget will not be used in any kind to create a monetary household income that could have an impact on the household's lighting behaviour. The CIPP will be observed by a group consisting of NGOs, community leaders, local authorities and legal representatives. Currently, the following organisation will be involved as observer:
  - AMDE Corporation. Cia. Ltda.
  - Agronomy Engineers Association
  - Confeniae: Indigenous Organization
  - Organization of women in Ecuador

  The benefit (lottery result) will be reported to all concerned households of the project activity, semi annually.

[8] IEC 60969 Self-ballasted lamps for general lighting services - Performance requirements
http://webstore.iec.ch/webstore/webstore.nsf/artnum/026814

[9] IEC 60901 Single-capped fluorescent lamps performance specifications
http://webstore.iec.ch/webstore/webstore.nsf/artnum/028244

[10] The sistema integral de beneficios will be provided as additional evidence to the DOE

B.3. Description of the sources and gases included in the project boundary

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The spatial extent of the project boundary includes the total project area and all power plants connected physically to the national grid (SNI).

	Source	Gas		Justification/Explanation
Baseline	Electricity generation of power plants connected to the national grid SNI.	CH_4	Excluded	Not applicable
		N_2O	Excluded	Not applicable
		CO_2	Included	Emission source
Project activity	Electricity generation of power plants connected to the national grid SNI.	CH_4	Excluded	Not applicable
		N_2O	Excluded	Not applicable
		CO_2	Included	Emission source

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

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The procedure for the selection of the most plausible baseline scenario according to the the approved baseline and monitoring methodology AM0046/Version 2 of "Distribution of efficient light bulbs to households"

The baseline scenario is that lighting in the households in the total project area would in the absence of the project activity have occurred:

(a) By utilisation of the currently used light bulbs (these light bulbs may include efficient and not efficient light bulbs); and

(b) By utilisation of new light bulbs with the same or greater efficiency (autonomous replacement)

The use of light bulbs in the absence of the project activity is determined by monitoring a control group of households – the baseline sample group (BSG) – over the whole crediting period. Since the baseline scenario for utilisation of lightening appliances is determined by monitoring a control group, any policies and measures affecting the use of light appliances are reflected in the baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

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Since the starting date of the project activity is before the date of validation, evidence is provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.

Date	Action/Event	Documentation
27/02/2007	Discussion between Ministry and CDM Consultant to use CDM as financing for CFL projects in Ecuador	Via email Evidence: 4A_timelineCDM_emailfeb2007
17/08/2007	Contract signing between Ministry and CDM Consultant for structuring project under CDM	Contract Evidence: 4B_TimelineCDM_contractministry_cdmconsultant
17/08/2007	Decree buget saving for CFL procurement	Declaration of Ministry No.573 Evidence 4C_TimelineCDM_decree573
28/12/2007	The first payment to the importer 2007 by the National Bank of Ecuador.	Statement of account by the National bank of Ecuador – booking number 755-2219 Evidence: 31_CFL_Buying_bank_international_Ecuador
31/10/ 2008	Submission of PDD for validation	www.unfccc.int

According to the approved methodology, the additionality of the project activity will be demonstrated and assessed by using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, available at the UNFCCC CDM web site. The project participants use the Version 5.02 of the methodology tool. http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity:

Alternative 1: The proposed project activity not undertaken as a CDM project activity
Alternative 2: Continuation of the current practice (Baseline scenario)

Sub-step 1b. Consistency with mandatory laws and regulations:
The identified alternatives 1, 2 are in consistency with mandatory laws and regulations.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method
The Ministry of Electricity and Renewable Energy, as project participant, is going to donate and distribute the CFLs for free to the households. The project activity generates no financial benefits other than CDM related income for the project participant. Therefore simple cost analysis (Option I) will be applied.

Sub-step 2b. – Option I. Apply simple cost analysis
The next table shows the estimated project activity costs, for each year and the total costs over the crediting period in U.S. Dollar.

	CREDITING PERIOD											
Costs / **Year**	**Start 2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**TOTAL COSTS US $**
CFL procurement	$6.600.000,00						$6.600.000,00					$13.200.000,00
CFL distribution	$3.400.000,00						$3.400.000,00					$6.800.000,00
TOTAL	**$10.000.000,00**						**$10.000.000,00**					**$20.000.000,00**

The procurement budget for the purchase and distribution of the CFLs is proposed with 10,000,000$ (reference degree No.573). The procurement costs of 6,600,000 CFLs are estimated with 6,600,000 US dollar and the countrywide distribution with 3,400,000 U.S. Dollar. The total cost statement will be available after the complete project is implemented.
The lifetime of the distributed CFL types is at least 8,000 hours and each household will receive a new CFL for each returned end-of-life CFL of the same quality within the crediting period. The lifetime of 8,000 hours equates 5,4 years, based on 4 hours lighting consumption per day. Thus the project participant is going to procure and to distribute 12,000,000 CFLs over the crediting period.

The project activity causes total costs of U.S $ 20,000,000 and produces no financial benefits other than CDM related income for the project participant. Therefore the proposed project activity not undertaken as a CDM project activity is no alternative (Alternative 1).

Step 3: Barrier analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

(c) Barriers due to prevailing practice, *inter alia*:
The project activity is the "first of its kind".

The project activity provides 6,000,0000 **C**ompact **F**luorescent **L**amp**s** (CFLs), as project technology, to Ecuadorian's households, where people live under the poverty level. The applications of CFLs are not in commercial operation in these households and are not proposed in another CDM project activity in Ecuador. The market price of a CFL is about $3 (20W/1800 hours) up to $21 (16W/10000hours) compared to a price of a 100W incandescent light bulb of about $0.30[11], which constitutes an essential barrier for households with people under poverty living conditions. Official, about 61.3%[12] of the households live under poverty conditions. The household income of such a household is $60 rural area to 144$/month[13], thus the buying of 4 CFLs would charge the household budget with about $12 and more, which is equal to 8 – 20% at minimum of the monthly income. There are no existing reasons for households to give up the continuation of the current practice.

Thus, the baseline scenario is the continuation of the current practice, which will be represented by the Baseline sample group households. The project activity concerns an essential part of Ecuadorian's population and faces a unique logistic procedure for the project participant. The CFLs will be distributed countrywide, which result a total project area of 256,000 km² from the highlands to the coast including not easily accessible areas, The CFLs will be delivered via ship cargo and transported overland via truck to centralized storage points. The distribution will be carried out by "900 teams" within 12 months.

This barrier and the opportunity to distribute CFLs countrywide and reduce Greenhouse gas emissions under Kyoto rules, lead the government to planning to buy and to distribute 6,000,000 CFLs to the households, where people live under poverty conditions, for free.

The project activity "Massive introduction of **C**ompact **F**luorescent **L**amp**s** (CFLs) to households in Ecuador can not be compared to any kind of activities in the past and represent the "first of its kind".

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The Alternative 2 "Continuation of the current practice" is not influenced by the above mentioned barriers.

[11] The prices of CFL and incandescent light bulbs will be given as additional evidence to the DOE.
[12] Boletín No. 5 Pobreza por necesidades básicas insatisfechas page 2 paragraph 1
[13] Evidence 49_la desigualdad de ingreso en el ecuador
table: "Cuadro 2. Ingreso per cápita de los hogares, 1995-1999"

Step 4: Common practice analysis

Unless the proposed project type has demonstrated to be first-of-its kind (according to Sub-step 3a), the above generic additionality tests shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region. This test is a ***credibility check*** *to complement the investment analysis (Step 2) or barrier analysis (Step 3).*

The project activity "Massive introduction of **C**ompact **F**luorescent **L**amp**s** (CFLs) to households in Ecuador" is the "first of its kind" , thus the Step 4 "Common practice analysis" will not be applied.

Based on the provided information under Step 2 and 3 the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The project implementation and thereby related emission reductions follow the stepwise approach of the methodology:

Step 1:	*Determination of the project area(s) i*
Step 2:	*Establishment of a project activity implementation plan*
Step 3:	*Determination of the size of the BSG and the PSG*
Step 4:	*Selection of the households to be included in the BSG and the PSG*
Step 5:	*Installation of measurement equipment*
Step 6:	*Allocation of households to the BSG and PSG*
Step 7:	*Establishment of a baseline sample buffer group (BSBG) and project sample buffer group (PSBG)(not mandatory)*
Step 8:	*Establishment of a project database*
Step 9:	*Monitoring of utilization hours / electricity consumption in the BSG and PSG*
Step 10:	*Determination of the power correction factor*
Step 11:	*Calculation of the mean and standard deviation of household electricity consumption for lighting*
Step 12:	*Estimation of technical distribution losses in the electricity grid*
Step 13:	*Cross-check of monitoring results by random sampling of households not included in the BSG,PSG, BSBG and PSBG*
Step 14:	*Calculation of emission reductions*

Step 1: Determination of the project area(s) i

The total project area, where the distribution of the CFLs will take place, is divided into 917 single project areas. 808 of these single areas correspond to urban areas and 109 areas are rural areas.
The countrywide distribution project area is divided into 808 urban and 109 rural areas.
The following information of each area is available via centralized database:

- Unique identification of each area per geographical division and number
- Geographical identification of each rectangular point by latitude and longitude
- Identification rural or urban area

According to the definition of the methodology (AM0046/Version 2) a urban area is defined as area where people live in continuously build-up areas in places with a population of 1,000 or more people and a population density of 400 or more people per km^2. A rural area is defined as area where less than 1,000 people live in one place or where the population density is less than 400 people per km^2.
The urban or rural area determination due to population density is based on the demographic information per geographical political division 2006, provided by the Instituto Geografico Militar (www.igm.gov.ec). For the project activity and according to the methodolody (AM0046/Version 2) an urban area is restricted to $4km^2$ and rural area is restricted to $3600km^2$. The "poverty level" of a political area is characterized by the NBI[14] criterias (Necesidaes Basicas Instatisfechas = Insatisfied Basic Needs). The NBI identification of the areas is provided by SIISE www.siise.gov.ec (Sistema Integrado de Indicadores Sociales del Ecuador) of the Technical Secretary of the Social Front from the Government of Ecuadorin in co-operation with INEC www.inec.gov.ec (National Institute of statistics and Census). All the information will be collected and available electronically and printed journals. The distinct geographical boundary of each single project area *i* can be clearly identified by GPS data (see detail A.4.1.4.). An overview of all project areas with geographical coordinates will be given as additional evidence (Annex 7) to the DOE.

Step 2: Establishment of a project activity implementation plan

The implementation of the project activity is demonstrated in Annex 6 and includes the following information, inter alia:

- *The type of light bulbs that are distributed or sold by the project coordinator, including information on the manufacturer, any label, the product number, the lumen, the power rating, the P-U characteristic curve, etc;*
  The CFL types will be tested prior the distribution process by an independent entity.
  CFLs samples of the the cargos will be taken and tested in accordance to norm IEC 60969 and IEC 60901 prior of the distribution process by an independent entity. The test results and documentation will be available as hardcopy on site.
  The Document includes:
  - Manufacture
  - Type identification (label, product number)
  - Luminous flux
  - Rated power

[14] **Definition:** Number of persons (or homes) that live under "poverty" expressed as total percentage of the population in a year. Poverty is considered to be, when a person household belongs to a home which presents persistent deficiency in the satisfaction of basic needs including household, health, education and employment.

Note: P-U characteristic curve
The project participant select option 1 "Installation of an electricity consumption meter" for all households for the pool of households, to measure the electricity consumption of all lighting appliances within the household (Step 5). Thus the determination of the P-U curve is not required for the calculation.

- *The number of project activity light bulbs (Li) that are planned to be distributed by the project activity in each project area i over the duration of the crediting period;*
The number of CFLs to be distributed over the crediting period, and eligible households, is available via standardidized completed carbon copy[15] and will be recorded via computer database system. . After the distribution process has been completed the planned number will be updated with the actual number of distributed CFLs.

GEOGRAPHICAL DIVISION			AREA PROJECT								TOTAL DATA BY AREA PROJECT		
PROVINCE	CANTON	PARISH	Ai (project area)	GEOGRAPHICAL COORDENATES							TOTAL Number of Households by Area Project	TOTAL Number of CFLs to be distributed by area project	Density
				LAT	LON	LAT	LON	LAT	LON	LAT	LON			
Manabi	Pedernales	Pedernales	1	665551.072636	10029733.810800	649032.233628	9972052.549020	591350.971846	9988571.388030	607869.810859	10046252.649600	6925	27702	

Database detail

Number of households within the project area i
Number of CFLs within the project area i

- *The total number of project activity light bulbs by type that is planned to be distributed by the project activity over the duration of the crediting perod;*
The total number of distributed and installed CFLs is 6.000.000 units. The lifetime of the distributed CFL types is at least 8,000 hours and each household will receive a new CFL for each returned end-of-life CFL of the same quality within the crediting period. In total 12.000.000 CFLs should be distributed over the crediting period.

- *Which households are eligible to participate in the project activity (e.g. households that are costumers of an electric utility, households with a certain income, etc)*
All households are eligible to participate in the project activity, when the household belongs to a poverty parish. Furthermore, connected to the national grid (SNI) and belong to an electricity distribution area with an aggregated average household consumption up to 200kWh/month.
The "poverty level" identification of the parish is characterized by the NBI criterias (Necesidaes Basicas Instatisfechas = Insatisfied Basic Needs). The NBI as indicator follows the recommendations of the Andean Community and is aligned to the objectives of the United Nations Millenium Development Goal to reduce the poverty until 2015.
The criteria are provided by SIISE www.siise.gov.ec (Sistema Integrado de Indicadores Sociales del Ecuador) of the Technical Secretary of the Social Front from the Government of Ecuadorin in co-operation with INEC www.inec.gov.ec (National Institute of statistics and Census).

[15] Formulario No3 Entrega/Recepcion de focus ahorradores en domicillio

- *How the light bulbs will be distributed or sold to household consumers, including a description of all measures employed under the project and a description how final consumers are motivated to participate in the project;*
  The distribution of the CFLs will be administrated by CNEL (Corporación Nacional de Electricidad) under the regime of the Ministry of Electricity and Renewable Energy. The distribution of the CFLs will be executed by CEFEN (Comitè de Eficiencia Energètica) supervised by CNEL. The distribution teams of CEFEN will be introduced and trained under the regime of the Ministry of Electricity and Renewable Energy. The distribution process will be observed by an independent organisation, e.g. AMDE Corp[16]. (Corporación Ambiente y Desarrollo). In some project areas the distribution process will be accompanied by police and military. The distribution team will be introduced by the competent electrical enterprise of the respective single project area.

  - The independent organisation, e.g. AMDE Corp., is observing
    - That the number of distributed CFLs corresponds with the number of returned destroyed active light bulbs and
    - The installation of the CFLs and the scrapping of returned incandescent light bulbs.

  The distribution process is done house by house and the returned active light bulbs will be destroyed directly on-site to prevent reuse. The installation and destruction on-site, according the methodology and implementation plan, will be observed by the independent organisation via unheralded inspection. The result of the inspection will be recorded via report. The prepared report will be available after the distribution. CENEL hand out a defined number of CFLs to defined distribution teams and areas and will record these via forms. After the installation, the destroyed lamps will be forwarded by the distribution team to CENEL and the returned metal sockets of the incandescent light will be counted. The number of returned metal sockets has to match the number of hand out CFLs. The handover of the metal socket will be done in the presence of a community leader and lawyer ("notario publico") and reported via confirmed form. After counting cross check the destroyed lamps will be forwarded to a recycling company for recycling. The handover to the recycling company will be documented via delivery note and confirmed by the recycling company and CENEL.

  The distribution process follows these steps (refer to Annex 6):
  Step 0 Training of the distribution team under the regime of Ministry of Electricity and Renewable Energy
  Step 1 Information to the households via media campaign, leaflets as well as orally
  Step 2 Function test of the returned light bulbs
  Step 3 Identification of the returned light bulbs by plate
  Step 4 Distribution of CFLs to the household
  Step 5 Destruction of returned light bulbs on-site.
  Step 6 Installations of the CFLs
  Step 7 Documentation and conformation on-site via form (refer to the next page)

[16] The Corporacion Ambiente y Desarrollo (AMDE Corp.) is a non profit organisation located in Las tunas y los membrillos. Urb. Ficoa, Ambato Ecuador and was founded 23 years ago. The president of the AMDE is represented by Edwin Herrera as president and Rebeca Vega Gonzalez as Executive Director. The organization is focused on projects in the context of sustainable development including risk assessment under scientific perspective. Generally each registered independent organization focus on sustainable development can perform in the function of AMDE for the future.

The form (Formulario No3 Entrega/Recepcion de focus ahorradores en domicillio) contains the following information:

- Date
- Identification of the distribution team
- Identification of the Household
- Result of the tested incandescent lights
- Watts per incandescent lights
- Number of destroyed incandescent lights
- Number and type of received CFLs
- Obligation of executive CFL care
- Signature of the household
- Confirmation household, distribution team and supervisor

The confirmed form is the contract between the household and the project participant.
The project participant has created a media campaign (refer Annex 5) and an "Incentive system of participation" to motivate final consumers to participate in the project.

- *How households included in all sample groups (BSG, BSBG, BCCG, PSG, PSBG and PCCG) will be selected randomly in a statistically representative manner.*
  All households included in all sample groups BSG, PSG, BCCG, PCCG (and if applied BSBG and PSBG) are charactrized and participate in the same statistically representative manner as all other households in the project activity.

  The statistically representative manner is characterized by:
  - the household is located within a poverty parish (NBI index)
  - connected to the national grid (SNI)
  - belong to an electricity distribution area with an aggregated average household consumption up to 200kWh/month

All eligible households will be forwarded from the respective electrical companies to SMT Aseor and collected via computer system. The households which can belong to the sample groups will be chosen by computer random function[17] from all eligible households. The random selection of the sample groups will be done for the total project area before the distribution starts. The computer randomic process will be observed and recorded by a representative of an independent organisation (e.g. AMDE Corp.). Directly after the random size procedure, a table of the potential households for the sample groups will be printed out and confirmed by the independent organisation. At the end of the process a randomly selected confirmed table of 12,000 potential households for the sample groups of the total project area, will be available.

[17] A presentation to describe the random function approach will be provided to the DOE.

Step 3: Determination of the size of the household pool to establish the BSG and the PSG

The households in the project sample group (PSG) and baseline sample group (BSG) will participate, and are charactrized, in the same statistically representative manner as all other households in the project activity. The household addresses of the PSG and BSG will be taken from the list of 12,000 potential households. (refer to last paragraph *Step 2: Establishment of a project activity implementation plan)*
The number n_i of households per single area i is based on the formula (1) of the methodology (refer to "*Step 4: Selection of the households to be included in the BSG and the PSG"* to determine n_i) Based on the training under the regime of the Ministry of Electricity and Renewable Energy, the distribution and installation team will provide the same level of service and information to all households in the BSG and PSG. This guarantee, that households included in the PSG receive the same level of information and services. According to the methodology, the minimum number of households in the BSG and PSG pool is 200 within the total project area. The project participant starts with a total size sample pool of 200 households ($n_{BSG+PSG}$= 200 according to formula 1 of the methodology) and may expand at a later stage within the crediting period.

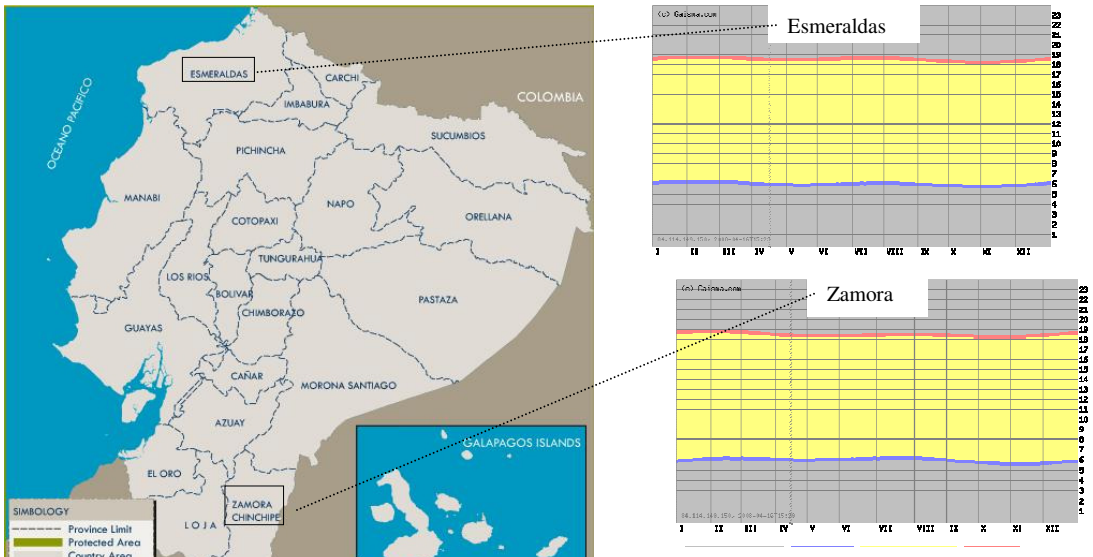
Step 4: Selection of the households to be included in the BSG and the PSG

All households included in household pool of the BSG and PSG will participate, and are charactrized, in the same statistically representative manner as all other households within the project activity.

The statistically representative manner is characterized by:

- the household is located within a poverty parish (NBI index)
- connected to the national grid (SNI)
- belong to an electricity distribution area, which is located within a project area, with an aggregated average household consumption up to 200kWh/month

Note. The consumption for lighting doesn't vary significantly over the year, because of the geographical position of Ecuador. The following illustration shows the way of sun over the year.



Sunrise, sunset, dawn and dusk times of Esmeraldas and Zamora[18]

The number of households that will be included in the pool (BSG and PSG) of households and used for sampling is calculated with formula (1) of the methodology.

$$n_i = \frac{L_i}{L_t} \times n_{BSG+PSG}$$

L_i = is collected and available via computer data base
L_t = 6,000,000

The n_i is calculated for each single project area i and for the scenario $n_{BSG+PSG}$=200
The result n_i per project area is calculated by computer and recorded via printed journals. When the number of households n_i for the project area i is less than 2 ($n_{BSG+PSG}$=200), several single project areas will be bundled to a monitoring area. The monitoring areas and the corresponding bundled project areas with calculated number of sample pool households will be available via computer database and printed journals (refer Annex 7).

[18] http://www.gaisma.com/en/

The households which can belong to the sample groups will be chosen by computer randomly from all eligible households. The household addresses of the PSG and BSG will be taken from the list of 12,000 potential households. (refer to last paragraph step *Step 2: Establishment of a project activity implementation plan)*. The project participant is going to take the household addresses for the BSG and PSG according to the list order. At the beginning the first 200 household addresses will be taken for the pool of BSG and PSG. When a household of the list is not willing or able to participate as BSG or PSG household the next household address of the list will be taken.

Step 5: Installation of measurement equipment

All selected households included in the pool of the BSG and PSG within the crediting period, will be fitted with electricity consumption meters prior the CFL distribution process affects these households.
The project participant select randomly 12,000 households, which includes the pool of BSG and PSG (refer to Step 2 and 4 above) households prior the CFL distribution starts in the total project area. The sectors (a sector is a part of electricity distribution area), where the 12,000 households are located, will not receive CFLs before the measurement equipment is installed and the coin toss procedure has been accomplished.
The households, which belong to the PSG, receive the CFLs from the project participant after the coin toss procedure. Therefore the distribution process can be divided into two steps for each single project area or monitoring area:

- CFL Distribution to all eligible households, excluding sectors where the 12,000 potential households are located.
- CFL Distribution to all PSG households, after the monitoring equipment installation and coin toss procedure.

The project participant chose option A "Measurement of the electricity consumption of all electric lighting appliances used by the household" of the methodology for the whole crediting period. All lighting circuits of the household are disconnected from other electrical circuits and lead to an electricity consumption meter to continually measure the electricity consumption for lighting. The installed electricity consumption meter is fitted with a remote telemetric data system. The electricity consumption meter can not reset and is equipped with a mechanical display. The electricity consumption meter and the remote telemetric data system is located in one box. The remote telemetric data system contains a GSM modem, which allows the remote enquiry of the lighting consumption at any time. The remote enquiry of the lighting consumption will be done once a week at least via a centralized server and a computer database system. The computer database system enables the storage of the lighting records of each household, which belongs to the BSG and PSG.
Therefore the project participant select option 1 "Installation of an electricity consumption meter" for the pool BSG and PSG households, to measure the electricity consumption of all lighting appliances within the household. The household receive no lighting appliances and no lighting appliances will be exchanged during the installation of the measurement equipment. The installation of the equipment represents the first spot check and will be reported via form.

Step 6: Allocation of households to the BSG and PSG

After the installation of the monitoring equipment and prior the distribution process affects the BSG and PSG households, each of these households will be dedicated for the BSG or PSG via coin toss. The coin toss procedure ends, when half of the monitoring equipped households belong to the BSG or PSG. The coin toss process will be recorded and observed by a representative of an independent organisation (e.g. AMDE Corp.) Directly after the coin toss process, a table of the BSG and PSG households will be printed out and confirmed by the independent organisation. (refer to Annex 6 Step G page 13). At the end of the process a confirmed table of 12,000 potential households, for the sample groups of the total project area, will be available.

Step 7: Establishment of a baseline sample buffer group (BSBG) and project sample buffer group (PSBG) (not mandatory)

The eligible households are stored via a centralized database. . If the number of households in the BSG or PSG is going to decrease, which can be determined within a week due to the remote telemetric data system, the project coordinator will randomly select another eligible household. The adding of BSG and PSG households will be observed by an independent organisation.

Step 8: Establishment of a project database

The project participant will establish a project database design prior the start of the distribution process. First, the project database will be based on Microsoft excel tables and later consolidated via oracle database solution (version 10g). At the end, the completed database system contains all updated information for the project activity. A database back up procedure every week guarantees the data security.

The database includes the following information:

- Number of households eligible for the project activity
- All project areas *i* with unique identification refer to A4.1.4
- All monitoring areas i with unique identification
- All households included in the BSG, PSG with unique identification and date of inclusion
- Installation date of the measurement equipment for each BSG and PSG household (date and type)
- Identification number of each household measurement equipment
- BSG and PSG household spot check information
    - Date of the spot check
    - Total number and number per room of lighting appliances found in the household according to option A "Measurement of the electricity consumption of all electric lighting appliances used by the household" with unique identification.
    - Function check of the lighting appliances
    - Changes in comparison to the last spot check
        - Used lighting appliances
        - Added or removed lighting appliances
    - Function and identification check of the measurement equipment
    - Changes made to the measurement equipment
    - Electricity consumption of lighting appliances by reading of the electricity lighting consumption meter (monitoring equipment)

- Households that receive CFLs, the following information will be available:

All information of the distributed CFLs per household is gathered by the distribution team with standard form. The complete standard form carbon copies (Formulario No3 Entrega/Recepcion de focus ahorradores en domicillio) of all households are kept on one point, and the essential information is transferred to the computer database system.

- Eligible household with unique identification number via form identification
- Date of receiving CFLs
- Number and type of the received CFLs
- Number of the returned and destroyed incandescent lamps

- Total electricity consumption of households at the BSG and PSG according to the invoice of the respective Electrical Distribution Enterprise for each monitoring interval y.
- Households included in the BCCG and PCCG
  - Unique identification (e.g.address, name and applicable project area i)
- Total electricity consumption of households in the BCCG and PCCG according to the invoice of the respective Electrical Distribution Enterprise for each monitoring interval y.
- Date of removal of household from BSG or PSG

Step 9: Monitoring of utilization hours / electricity consumption in the BSG and PSG

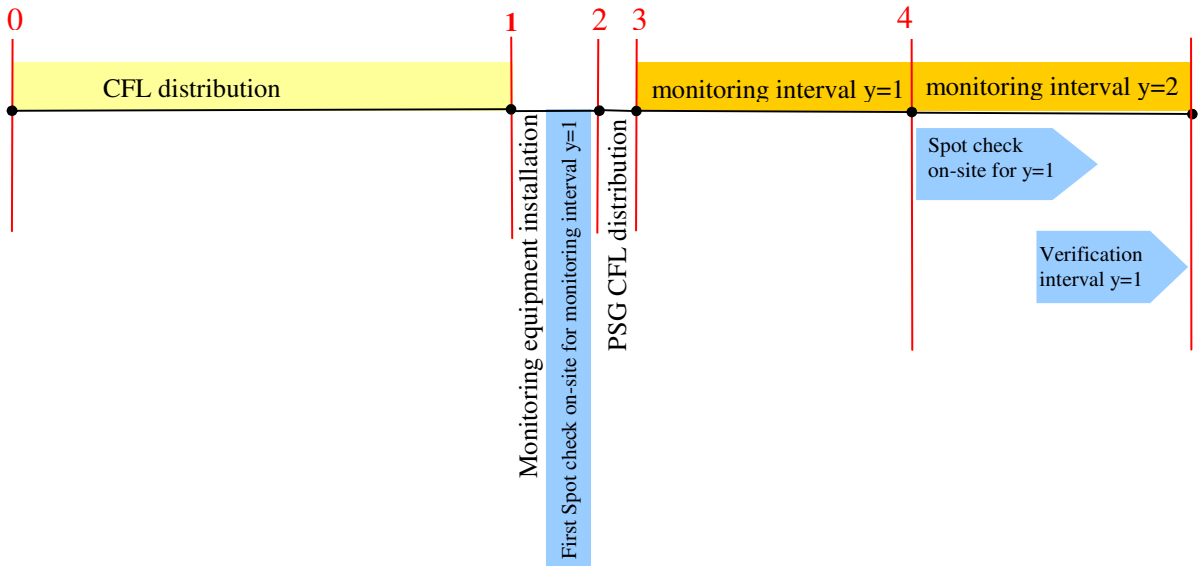
The project participant monitors the electricity consumption for lighting of households in the BSG and PSG via remote telemetric data system and on-site check. The installed electricity consumption meter is fitted with a remote telemetric data system. The retrieval of the lighting consumption information is done automatically once a week at least and the information (lighting consumption meter reading) will be send to a centralized server, connected with the computer database system. The consumption information, corresponding with the unique identification of the household and date is collected and stored by the database system. The databasesystem will be backed up every week to gurantee data storage. Based on the remote telemetric data system, the electricity consumption of lighting is available at the same time for each household included in the BSG and PSG. Therefore the monitoring interval y is the time between two defined time points and the remote retrieval of the electricity lighting consumption information of each household at these time points The electricity consumption for lighting at these two time points and the corresponding household is available via database and printed journals (refer to annex 6 implementation plan page 19 to 24).

The retrieval of the lighting consumption information at the beginning and the end of the monitoring interval will be observed by an idependent organisation. The first on-site check is represented at the time point of the measurement equipment installation. The on-site spot check of a monitoring household encompasses the issues under step 8. The first monitoring interval starts by the choice of the project participant, under the following requirements:

- Project is registered
- CFLs are distributed to dedicated households
- Monitoring equipment installed and working;
- Monitoring meter reading via remote telemetric data system of all BSG and PSG at one defined time point. (see next illustration timepoint 3 and Annex 6 page 21).

The first monitoring interval ends by the choice of the project participant via monitoring meter reading via remote telemetric data system of all BSG and PSG at one definded time point. (see next illustration timepoint 4 and Annex 6 page 23). Directly after the time point all monitoring households will be inspected via on-site spot check, as quality procedure.

The on-site spot check of a monitoring household encompasses the issues under step 8. The meter reading determined via on-site spot check, will be back-calculated, using the mean daily lighting electricity consumption, for the end time point of the monitoring interval (see next illustration timepoint 4). and compared with the reading via remote telemetric data system at the same time point (timepoint 4). The comparison of the back-calculated and meter reading via remote telemetric data ensure the plausibility of the lighting consumption measurement. The monitoring household spot checks on-site will be undertaken within three weeks. The spot check personnel is introduced to give no additional written, oral information or recommendations on the use of light bulbs as other households of the project activity has given. After the on-site spot check of all monitoring households and the record of the collected information, the calculation of the Emission reductions over the monitoring interval y will be done.



Point 0:	• CFL delivery • start of the distribution • Pool of households determined (12,000 households)
Point 1	• CFLs distributed excluded sectors, where the pool of households are located • Installation of the monitoring equipment including first spot check in all pool households (BSG and PSG) *The initial installation of measurement equipment according to step 5 is regarded as the first spot check undertaken in the household. (page 11/AM0046)*
Point 2	• Determination of the household for the BSG or PSG via coin toss • Distribution to the determined PSG households
Point 3	• Start of the monitoring interval y=1 under the following requirements: ▪ Project is registered ▪ CFLs are distributed to dedicated households ▪ Monitoring equipment installed and working; ▪ Monitoring meter reading via remote telemetric data system of all BSG and PSG at one defined time point.
Point 4	• End of monitoring interval 1 and start of monitoring interval 2 ▪ monitoring meter reading via remote telemetric data system of all BSG and PSG at one time point ▪ Start on-site spot check

Step 10: Determination of the power correction factor

Not applicable.

The electricity consumption for lighting in the project activity is metered directly (Option 1) and thus the effect of varying grid voltage is included in the measurement results and the power correction factor will not need to be considered.

Step 11: Calculation of the mean and standard deviation of household electricity consumption for lighting

After undertaking spot checks at all households included in the BSG and the PSG, the mean and standard deviation of household electricity consumption for lighting during the monitoring interval *y* (according to the illustration under Step 9) for the baseline and the project activity will be calculated. The calculation is done be done by computer via formula (5), (6), (7), (8), (9) and (10) of the methodology, and will be provided in a comprehensive manner by printed journals.

Electricity consumption for lighting of BSG households

- $EC_{BSG,k,y} = \sum_{n} EC_{BSG,k,n,y}$ (5)

Where:

$EC_{BSG,k,n,y}$	Electricity consumption for lighting in household *k* (Option A) during the monitoring interval *y* (kWh)
k	Households included in the BSG
n	Lighting appliances installed in household *k* during the monitoring interval *y* and fitted with an electricity consumption meter

Electricity consumption for lighting of PSG households

- $EC_{PSG,l,y} = \sum_{n} EC_{PSG,l,n,y}$ (6)

Where:

$EC_{PSG,l,n,y}$	Electricity consumption for lighting in household *l* (Option A) during the monitoring interval *y* (kWh)
l	Households included in the PSG
n	Lighting appliances installed in household *k* during the monitoring interval *y* and fitted with an electricity consumption meter

Mean of electricity consumption for lighting of BSG households

- $\mu_{EC,BSG,y} = \frac{\sum_{k=1}^{n_{BSG,y}} EC_{BSG,k,y}}{n_{BSG,y}}$ (7)

Where:

$EC_{BSG,k,y}$	Electricity consumption for lighting in household *k* (Option A) during the monitoring interval *y* (kWh)
$n_{BSG,y}$	Total number of households *k* included in the BSG during the monitoring interval y

Mean of electricity consumption for lighting of PSG households

- $$\mu_{EC,PSG,y} = \frac{\sum_{l=1}^{n_{PSG,y}} EC_{PSG,l,y}}{n_{PSG,y}} \quad (8)$$

Where:

$EC_{PSG,l,y}$	Electricity consumption for lighting in household *l* (Option A) during the monitoring interval *y* (kWh)
$n_{PSG,y}$	Total number of households *l* included in the PSG during the monitoring interval y

Standard deviation of electricity consumption for lighting of BSG households

- $$\sigma_{EC,BSG,y} = \sqrt{\frac{\sum_{k=1}^{n_{BSG,y}} (EC_{BSG,k,y} - \mu_{EC,BSG,y})^2}{n_{BSG,y} - 1}} \quad (9)$$

Where

$EC_{BSG,k,y}$	Electricity consumption for lighting in household *k* (Option A) during the monitoring interval *y* (kWh)
$\mu_{EC,BSG,y}$	Mean household electricity consumption for lighting of households included in the BSG for the monitoring interval *y* (kWh)
$n_{BSG,y}$	Total number of households *k* included in the BSG during the monitoring interval y

Standard deviation of electricity consumption for lighting of BSG households

- $$\sigma_{EC,PSG,y} = \sqrt{\frac{\sum_{l=1}^{n_{PSG,y}} (EC_{PSG,k,y} - \mu_{EC,PSG,y})^2}{n_{PSG,y} - 1}} \quad (10)$$

Where:

$EC_{PSG,l,y}$	Electricity consumption for lighting in household *l* (Option A) during the monitoring interval *y* (kWh)
$\mu_{EC,PSG,y}$	Mean household electricity consumption for lighting during the monitoring interval *y* of households included in the PSG that have received light bulbs from the project coordinator prior to the start of the spot check that was undertaken at the beginning of themonitoring interval *y* (kWh)
$n_{PSG,y}$	Total number of households *l* included in the PSG during the monitoring interval y

Step 12: Estimation of technical distribution losses in the electricity grid

The technical distribution losses of the national grid SNI is calculated by CONELEC[19] (National Electricity Council) and CENACE[20] (National Center for Energy Control) .
The Technical distribution losses TDLy in the electricity grid is 9.20%[21] for the year 2007 and considered in the ex-ante calculation of the emission reductions section (refer to B.6.3).

Step 13 Cross-check of monitoring results by random sampling of households not included in the BSG, PSB, BSBG and PSBG

The project participant will establish a baseline cross-check group (BCCG) and project cross-check group (PCCG) for each monitoring interval y after the end of these monitoring interval. The households of the BCCG and PCCG were stratified and selected in the same manner as the households in the BSG and PSG (refer to Step 4). The households of the BCCG and PCCG are not included in the BSG, PSG, but are conform in the same way like households within the BSG and PSG over the respective monitoring interval y. The project participant collects the total electricity consumption over the monitoring interval y of each household included in the:

- BSG
- PSG
- BCCG
- PCCG

The electrical consumption will be determined by using total electricity consumption invoice provided by the household or electricity supply company. The mean daily electricity consumption is calculated on the account period of the invoice. In case that the time period of the invoice is not congruent to the monitoring interval y, the electricity consumption of the household will be adjusted to the monitoring interval y by using the adjustment methods as applied by the electricity distribution company. In the absence of any adjustment method, the mean daily electricity consumption will be derived from the electricity invoices and be applied to the monitoring interval y.

The mean calculation of the total electricity consumption for the monitoring interval y of households in the BSG, PSG, BCCG and PCCG follows formula (11), (12), (13) and (14) of the methodology.

[19] The CONELEC (www.conelec.gov.ec) (Consejo Nacional de Electricidad-National Conseil of Electricity) is entity in charge of the development planification for the electric energy sector. (Ley de Regimen del Sector Electrico, Capitulo IV, Articulo 12)

[20] The CENACE (www.cenace.gov.ec) (Centro Nacional de Control de Energia-National Center for Energy Control) is in charge of the technical and financial management of energy. (Ley de Regimen del Sector Electricco, Capitulo V, Articulo 22)

[21] Estadistica del Sector Electrico Ecutariano, year 2007 chapter 1 table 1.3.4 Balance Nacional del Sector Eléctrico - perdidas en distribucion (6) page 49

Mean of total electricity consumption of BSG households

- $$\mu_{EC,TOT,BSG,y} = \frac{\sum_{k=1}^{n_{BSG,y}} EC_{TOT,BSG,k,y}}{n_{BSG,y}} \quad (11)$$

Where:

$EC_{TOT,BSG,k,y}$	Total electricity consumption of household *k* during the monitoring interval *y* (kWh)
$n_{BSG,y}$	Total number of households *k* included in the BSG during the monitoring interval y

Mean of total electricity consumption of PSG households

- $$\mu_{EC,TOT,PSG,y} = \frac{\sum_{l=1}^{n_{BSG,y}} EC_{TOT,PSG,l,y}}{n_{PSG,y}} \quad (12)$$

Where:

$EC_{TOT,PSG,l,y}$	Total electricity consumption of household *l* during the monitoring interval *y* (kWh)
$n_{PSG,y}$	Total number of households *l* included in the PSG during the monitoring interval y

Mean of total electricity consumption of BCCG households

- $$\mu_{EC,TOT,BCCG,y} = \frac{\sum_{s=1}^{n_{BCCG,y}} EC_{TOT,BCCG,s,y}}{n_{BCCG,y}} \quad (13)$$

Where:

$EC_{TOT,BCCG,s,y}$	Total electricity consumption of household *s* during the monitoring interval *y* (kWh)
$n_{BCCG,y}$	Total number of households s included in the BSG during the monitoring interval y

Mean of total electricity consumption of PCCG households

- $$\mu_{EC,TOT,PCCG,y} = \frac{\sum_{s=1}^{n_{PCCG,y}} EC_{TOT,PCCG,t,y}}{n_{PCCG,y}} \quad (14)$$

Where:

$EC_{TOT,PCCG,t,y}$	Total electricity consumption of household *t* during the monitoring interval *y* (kWh)
$n_{PCCG,y}$	Total number of households *t* included in the PSG during the monitoring interval y

T- test according to the methodology and applying of the Adjustemt factor if applicable.
The Adjustment factor for the BSG and PSG for the monitoring interval y is calculated via formula (15) and (16) of the methodology.

Adjustment factor for the BSG

- $$f_{BSG,y} = 1 - \frac{\mu_{EC,TOT,BSG,y} - \mu_{EC,TOT,BCCG,y}}{\mu_{EC,BSG,y}} \quad (15)$$

Adjustment factor for the PSG

- $$f_{PSG,y} = 1 + \frac{\mu_{EC,TOT,PCCG,y} - \mu_{EC,TOT,PSG,y}}{\mu_{EC,PSG,y}} \quad (16)$$

Step 14: Calculation of emission reductions

The emission reduction is calculated according to formula (17) of the methodology.
Calculation of Emission reductions during the monitoring interval y (t CO_2):

- $$ER_y = \frac{n_{HH,y} \times \left[\left(\mu_{EC,BSG,y} \times f_{BSG,y} - z \times \frac{o_{EC,BSG,y}}{\sqrt{n_{BSG,y}}} \right) - \left(\mu_{EC,PSG,y} \times f_{PSG,y} + z \times \frac{o_{EC,PSG,y}}{\sqrt{n_{PSG,y}}} \right) \right] \times EF_{CO2,ELEC,y}}{1 - TDL_y} \quad (17)$$

Where:

$n_{HH,y}$	Number of households eligible for calculating emission reductions for the monitoring interval y
Z	Standard normal for a confidence level of 95% (1.96 for n > 200)
$EF_{CO2,ELEC,y}$	CO2 emission factor for displacement of electricity in the grid serving the household consumers that participate in the project during the monitoring interval *y*, calculated according to the latest approved version of "Tool to calcuate emission factor for an electricity system"(t CO2 / kWh) $EF_{CO2,ELEC,y} = EF_{grid,CM,y}$
TDLy	Technical distribution losses in the electricity grid serving the household consumers that participate in the project during the monitoring interval *y* (kWh of technical electric losses in the electricity grid / kWh of electricity supplied to final consumers)

Originally, the Combined Margin emission factor $EF_{CO2,ELEC,y}$ was provided by CORDELIM (www.cordelim.net).CORDELIM (Oficina Nacional de Promoción del Mecanismo de Desarrollo Limpio de Ecuador) was created by the Ecuadorian National Climate Committee (CNC) and is responsible for the Combined Margin emission factor calculation and publishing. The source for the $EF_{CO2,ELEC,y}$ applied for 2004-2006 is not longer published on the website. Therefore the $EF_{CO2,ELEC,y}$ is calculated as follows

Calcualtion of the $EF_{CO2,ELEC,y}$

The combined margin (CM) emissionfactor $EF_{CO2,ELEC,y}$ is calculated via the latest approved version of UNFCCC methodological tool "Tool to calcuate emission factor for an electricity system (Version 02)[22]," and based on confirmed data by the Ministry of Electricity and Renewable Energy. The calculation is provided via additional document to the DOE. The following steps will be applied:

STEP 1. Identify the relevant electricity systems.

The relevant electricity grid is the Interconnected National System (SNI), which represent the only interconnected grid system in Ecuador[23], thus the geographic and system boundary are clearly identified. All involved households within the project activity are connected to the national grid SNI.

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).

The following option is choosen:

Option I: Only grid power plants are included in the calculation.

STEP 3. Select a method to determine the operating margin (OM).

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following method:

(b) Simple adjusted OM

For the the simple adjusted OM the emissions factor the following data vintage will be used

Ex ante option:

For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. At the time of the submission the data for the year 2004, 205, 2006 were available and used for the calculation.

Step 4: Calculate the operating margin emission factor according to the selected method

The project participant chooses (b) Simple adjusted OM thus formula 8 will be applied:

$$EF_{grid,OM-adj,y} = (1-\lambda) \times \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \times \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

Where:

$EF_{grid,OM-adj,y}$	Simple adjusted operating margin CO_2 emission factor in year y (tCO_2/MWh)
λ_y	Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year y
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) The $EG_{m,y}$ will be by the ministery of electricity and renewable energy
$EG_{k,y}$	Net quantity of electricity generated and delivered to the grid by power unit k in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{EL,k,y}$	CO_2 emission factor of power unit k in year y (tCO_2/MWh)

[22] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf

[23] Detail information CENACE (National Center for Energy Control) website: http://www.cenace.org.ec/index.php?option=com_phocadownload&view=sections&Itemid=50

m	All grid power units serving the grid in year y except low-cost/must-run power units
k	All low-cost/must run grid power units serving the grid in year y Net electricity imports must be considered low-cost/must-run units *k*.
y	The relevant year as per the data vintage chosen in Step 3 (2004, 2005, 2006)

The emission factor $EF_{EL,m,y:}$

For the power unit *m* only data on electricity generation, the fuel type and the efficiency of the power unit is available. Therefore the project participant choose Option A2 to determine $EF_{EL,m,y}$ (formula (3) of the tool)

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO2/GJ) The $EF_{CO2,i,y}$, $NCV_{i,y}$ (Net calorific value) density of the used fuel type in the power plant m will be provided by the ministery of electricity and renewable energy.
$\eta_{m,y}$	Average net energy conversion efficiency of power unit *m* in year *y* (ratio) The Average net energy conversion efficiency will be provided by the ministery of electricity and renewable energy. The $\eta_{m,y}$ is given in EG_m/gallon fuel type and converted into $\eta_{m,y}$.
m	All power units serving the grid in year *y* except low-cost/must-run power units
y	The relevant year as per the data vintage chosen in Step 3 (2004, 2005, 2006)

The emission factor $EF_{EL,k,y:}$

All low-cost/must run grid power units k serving the SNI are non fossil fuel based thus $EF_{EL,k,y} = 0$

The parameter λy is defined as follows:

$$\lambda_y = \frac{\text{Number of hours low - cost / must - run sources are on the margin in year y} -}{8760 \text{ hours per year}}$$

The Lambda (λ_y) will be calculated via the steps (i), (ii), (iii), (iv) according the tool.
Note: The year 2004 as leap year will be considered with 8784 hours.

STEP 5. Identify the group of power units to be included in the build margin (BM).

The sample group of power units *m* used to calculate the build margin consists of either:
(a) The set of five power units that have been built most recently;or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.
Project participants should use the set of power units that comprises the larger annual generation.
The sample group of power units *m* used to calculate the build margin is based on data provided by the ministery of electricity and renewable energy.
The set of power capacity additions in the electricity system SNI that comprise 20% of the system generation (in MWh) and that have been built most recently comprises the larger generation in the year 2006. The Power plants registered as CDM project activities were excluded from the sample group m.

STEP 6. Calculate the build margin emission factor.
The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units *m* during the year 2006 and calculated via formula (13) as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available. The most recent historical year is 2006

STEP 7. Calculate the combined margin (CM) emissions factor.
The combined margin emissions factor is calculated via formula (14) as follows:

$EF_{grid,CM,y}=EF_{grid,OM,y} \times w_{om}+EF_{grid,BM,y} \times w_{BM}$

Where:

$EF_{grid,CM,y}$	Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh) y=2006
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh) y=2006
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) y = 2004 - 2006
w_{OM}	Weighting of operating margin emissions factor (%) w_{OM} = 0.5 for all other projects
w_{BM}	Weighting of build margin emissions factor (%) w_{BM} = 0.5 for all other projects

The project represents no wind and solar project therefore the following default values for other projects will be used for w_{OM} and w_{BM}:
w_{OM} = 0.5
w_{BM}= 0.5

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$\mathbf{n_{BSG+PSG}}$
Data unit:	-
Description:	Total size of the pool of households used for sampling of the BSG and PSG Number of households in the Baseline sample group (BSG) and Project sample group (PSG).
Source of data used:	Project participants may deliberately choose any size ≥ 200 households
Value applied:	**200**
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	$n_{BSG+PSG} = n_{BSG} + n_{PSG}$

Data / Parameter:	$\mathbf{n_{BSG}}$
Data unit:	-
Description:	Number of households in the Baseline sample group (BSG) at the start of the project activity.
Source of data used:	Project participants may deliberately choose any size ≥ 100 households
Value applied:	$\mathbf{n_{BSG}}$ =100
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	$n_{BSG} = n_{PSG}$

Data / Parameter:	n_{PSG}
Data unit:	-
Description:	Number of households in the Project sample group (PSG) at the start of the project activity.
Source of data used:	Project participants may deliberately choose any size ≥ 100 households
Value applied:	n_{PSG} =100
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	$n_{PSG} = n_{BSG}$

Data / Parameter:	z
Data unit:	-
Description:	Standard normal for a confidence interval of 95%
Source of data used:	-
Value applied:	1.96[24]
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	z = 1.96 for $n_{BSG}+n_{PSG} \geq 200$

[24] http://www.mypivots.com/Investopedia/Details/233/z-score

Data / Parameter:	$\mathbf{EF_{CO2,ELEC,y}} = EF_{grid,CM,y}$
Data unit:	ton CO_2 / kWh
Description:	Combined Margin emission factor - CO_2 emission factor for displacement of electricity in the grid serving the household consumers that participate in the project during the monitoring interval *y*, calculated according to the latest approved version of "Tool to calculate emission factor for an electricity system" The $EF_{CO2,ELEC,y}$ is determined ex-ante for the crediting period.
Source of data used:	The data will be available for the year 2004-2006 and provided by Ministry of Electricity and Renewable Energy Offical data files: CVP_2004, CVP_2005, CVP_2006, GN_2004, GN_2005, GN_2006, BM_2006 The project participant select the ex-ante option, which using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation, to determine the Combined Margin emission factor $EF_{CO2,ELEC,y}$ over the crediting period. The Combined Margin emission factor $EF_{CO2,ELEC,y}$ data will be calculated by the project participant and the data and calculation will be available for the validation.
Value applied:	0.63956 t CO_2/MWh for the crediting period
Justification of the choice of data or description of measurement methods and procedures actually applied :	See "Tool to calculate emission factor for an electricity system" Version 2 http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html official data files: CVP_2004, CVP_2005, CVP_2006, GN_2004, GN_2005,GN_2006, BM_2006
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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The ex-post calculation of emission reduction will be done via the listed formula under Step 14 (B.6.1 Emission reductions). These data are not available ex-ante, thus the baseline ex-ante calculation is based on the following assumptions:

- Number of households eligible for calculating emission reductions: 1.500.000
- 10% [25] error rate (households are not eligible however receive CFLs): 150000
- 4 units installed 100W incandescent light bulbs (Baseline)
- 4 units installed 20W CFLs (Project activity)
- 4 hours of lighting consumption per day
- Emission factor: 0.63956 t CO_{2eq}/year
- Technical distribution losses 2007: 9,20%

Baseline emissions: (refer to Annex 3 Baseline information)
(1,500,000 households- 150000 households) x 100W x 4bulbs/household x 4h/day x 365 days/year x0.63956tCO2/MWh = 504,229 tCO_{2eq}/year

Project emissions:
(1,500,000 households - 150000 households) x 20W x 4bulbs/household x 4h/day x 365 days/year x 0.63956tCO2/MWh = 100,846 t CO_{2eq}/year

Emission reductions:
504,229 t CO_{2eq}/year - 100,846 t CO_{2eq}/year = 403,383 t CO_{2eq}/year
403,383 tCO_2/ year /(1-0,0920) Technical distribution losses = 444,255 tCO_2/year

[25] During the distribution housholds could potentially receive CFLs in state of 60W lamps and thus these households are not eligible under the project activity. This circumstance is estimated between 1-3% by the experience of the electrical distribution companies and can be determined after the distribution process only. Therefore, for the emission reduction calculation, ex-ante, this circumstance is considered with 10% error rate as conservative approach.

B.6.4 Summary of the ex-ante estimation of emission reductions:

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The following table summarise the ex-ante emission results of B.6.3 :

Estimation of emission reductions due to the proposed project activity:

Year	Estimation of baseline emissions	Estimation of project emissions	Estimation of leakage	Estimation of overall emission reductions[26]
	BEy	PE_y	L_y	ER_y
	[tCO_{2eq}]	[tCO_{2eq}]	[tCO_{2eq}]	[tCO_{2eq}]
2011	504,229	100,846	-	444,255
2012	504,229	100,846	-	444,255
2013	504,229	100,846	-	444,255
2014	504,229	100,846	-	444,255
2015	504,229	100,846	-	444,255
2016	504,229	100,846	-	444,255
2017	504,229	100,846	-	444,255
2018	504,229	100,846	-	444,255
2019	504,229	100,846	-	444,255
2020	504,229	100,846		444,255
Total (t CO_{2eq})	**5,042,290**	**1,008,460**	**-**	**4,442,550**

[26] The estimation of the overall emission reduction consider the technical losses and error rate of 9.20% (refer to B.6.3)

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**L_i**
Data unit:	-
Description:	Number of project activity light bulbs to be distributed by the project participant in project activity area *i* over the whole crediting period as per the project activity plan
Source of data to be used:	Deliberate choice by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	6,000,000 for the first time
Description of measurement methods and procedures to be applied:	The hand out CFLs will be registered via form.
QA/QC procedures to be applied:	The number of distributed CFLs will be compared with the number of scrapped light bulbs. The forms will be kept on one centralized point. All data will be stored 3 years after the end of the crediting period.
Any comment:	The number of distributed CFLs will be available after the distribution process is completed. All information of the distributed CFLs per household is gathered by the distribution team with standard form. The complete standard form carbon copies (Formulario No3 Entrega/Recepcion de focus ahorradores en domicillio) of all households are stored, and the essential information is transferred to the computer database system. ▪ Eligible household with unique identification number via form identification ▪ Date of receiving CFLs ▪ Number and type of the received CFLs Number of the returned and destroyed incandescent lamps

Data / Parameter:	**L_t**
Data unit:	-
Description:	Total number of light bulbs to be distributed by the project participant over the whole crediting period as per the project activity plan
Source of data to be used:	Deliberate choice by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	6,000,000 for the first time Refer to *Step 2: Establishment of a project activity implementation plan* of the PDD
Description of measurement methods and procedures to be applied:	The hand out CFLs will be registered via form. The summarized information of the household forms (Formulario No3 Entrega/Recepcion de focus ahorradores en domicillio) outcome the distributed CFLs
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	The number of distributed CFLs will be available after the distribution process is completed.The summary of all L_i is L_t

Data / Parameter:	$\mathbf{EC_{BSG,k,n,y}}$
Data unit:	kWh
Description:	Electricity consumption of lighting appliance *n* in the household *k* during the monitoring interval *y*, where • *n* are the lighting appliances installed in household *k* (Option A) during the monitoring interval *y* and fitted with an electricity consumption meter, and • *k* are the households included in the BSG during monitoring interval *y*.
Source of data to be used:	Project participant choice Baseline group households (BSG): By electricity consumption meter reading via remote telemetric data system and database storage and data analyzing and by electricity consumption meter reading on-site via spot check Refer to step 9
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Ex-ante: • 100 W incandescent lamps • 4 units per household • 4 hours per day Ex-post Measurements by project participants
Description of measurement methods and procedures to be applied:	Continuous metering, reading of the meter Electricity consumption meter reading via remote telemetric data system Electricity consumption meter reading on-site via spot check
QA/QC procedures to be applied:	The electricity consumption meter can not reset and is equipped with a mechanical display. The consumption meter reading via remote telemetric data system is checked via spot check. (refer to step 9). During the spot check the issues will be inspected: • BSG household spot check information o Date of the spot check o Total number and number per room of lighting appliances found in the household according to option A "Measurement of the electricity consumption of all electric lighting appliances used by the household" with unique identification. and date of inclusion o Function check of the lighting appliances o Changes in comparison to the last spot check ▪ Used lighting appliances ▪ Added or removed lighting appliances o Function and identification check of the measurement equipment o Changes made to the measurement equipment o Electricity consumption of lighting appliances by reading of the electricity lighting consumption meter (monitoring equipment) The electricity consumption of lighting reading during the spot check will be back-calculated for the time point of telemetric meter reading and compared as quality cross-check. The comparison of the back-calculated and reading via remote telemetric data ensure the plausibility of the lighting consumption measurement. The back-calculation is based on mean daily lighting consumption. The continous meter reading by the telemetric sytem will stored via database and a back up will be done every week. The complete form of the spot site check will be stored on one centralized point. All data will be stored 3 years after the end of the crediting period. All energy measurement meters for lighting consumption will be calibrated and regularly maintained and checked for its functioning according to manufacturer's specification and the international standards EN50470-1 and EN50470-3.

Any comment:	All lighting circuits of the household are disconnected from other electrical circuits and lead to an electricity consumption meter to determine the electricity consumption for lighting.

Data / Parameter:	$EC_{PSG,l,n,y}$
Data unit:	kWh
Description:	Electricity consumption of lighting appliance *n* in the household *l* during the monitoring interval *y*, where • *n* are the lighting appliances installed in household *l* (Option A) during the monitoring interval *y* and fitted with an electricity consumption meter, and • *l* are the households included in the PSG that have received light bulbs from the project participant prior to the start of the spot check (i.e. the date of the first visit of a household during the spot checking period) that was undertaken at the beginning of the monitoring interval *y*.
Source of data to be used:	Project participant choice: Project group households (PSG): By electricity consumption meter reading via remote telemetric data system and database storage and data analyzing and by electricity consumption meter reading on-site via spot check Refer to step 9
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Ex-ante: • 20W CFL lamps • 4 units per household • 4 hours per day Ex-post • Measurements by project participants
Description of measurement methods and procedures to be applied:	Continuous metering, reading of the meter Electricity consumption meter reading via remote telemetric data system Electricity consumption meter reading on-site via spot check
QA/QC procedures to be applied:	The consumption meter reading via remote telemetric data system is checked via spot check. (refer to step 9). During the spot check the issues will be inspected: • BSG household spot check information o Date of the spot check o Total number and number per room of lighting appliances found in the household according to option A "Measurement of the electricity consumption of all electric lighting appliances used by the household" with unique identification. and date of inclusion o Function check of the lighting appliances o Changes in comparison to the last spot check ▪ Used lighting appliances ▪ Added or removed lighting appliances o Function and identification check of the measurement equipment o Changes made to the measurement equipment o Electricity consumption of lighting appliances by reading of the electricity lighting consumption meter (monitoring equipment) The electricity consumption of lighting reading during the spot check will be back-calculated for the time point of telemetric meter reading and compared as quality cross-check. The comparison of the back-calculated and reading via remote telemetric data ensure the plausibility of the lighting consumption measurement.

	The back-calculation is based on mean daily lighting consumption. The continous meter reading by the telemetric sytem will stored via database and a backup will be done every week. The complete form of the spot site check will be stored on one centralized point. All data will be stored 3 years after the end of the crediting period. All energy measurement meters for lighting consumption will be calibrated and regularly maintained and checked for its functioning according to manufacturer's specification and the international standards EN50470-1 and EN50470-3.
Any comment:	All lighting circuits of the household are disconnected from other electrical circuits and lead to an electricity consumption meter to determine the electricity consumption for lighting.

Data / Parameter:	$\mathbf{n_{BSG,y}}$
Data unit:	-
Description:	Total number of households *k* included in the BSG during the monitoring interval *y*
Source of data to be used:	Project participant choice
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 for the first monitoring interval y
Description of measurement methods and procedures to be applied:	Determination for each monitoring interval *y*
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$n_{PSG,y}$
Data unit:	-
Description:	Total number of households *l* included in the PSG during the monitoring interval y, corresponding to the number of households included in the PSG that have received light bulbs from the project participant prior to the start of the spot check (i.e. the date of the first visit of a household during the spot checking period) that was undertaken at the beginning of the monitoring interval *y*
Source of data to be used:	Project participant choice
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 for the first monitoring interval y
Description of measurement methods and procedures to be applied:	Determination for each monitoring interval *y*
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$n_{HH,y}$
Data unit:	-
Description:	Number of households eligible for calculating emission reductions for the monitoring interval *y*
Source of data to be used:	Documentation by the project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Ex-ante: 1,500,000 households Ex-post: Eligible Criteria: ▪ the household is located within a poverty parish (NBI index) ▪ connected to the national grid (SNI) ▪ belong to an electricity distribution sector with an aggregated average household consumption up to 200kWh/month ▪ Receive CFLs in return of incandescent light bulbs in the same number
Description of measurement methods and procedures to be applied:	Counting of households which are eligible.
QA/QC procedures to be applied:	Continuous collection of the date of distribution of lighting appliance to a household. All data will be stored 3 years after the end of the crediting period.
Any comment:	The number of households that are eligible for calculating emission reductions for the monitoring interval *y* corresponds to the number of households that have received efficient light bulbs in return for incandescent light bulbs from the project participant in the time period between the start of the project activity until the start of the monitoring interval *y*. This means that households that have received efficient light bulbs from the project participant during the monitoring interval *y* are only eligible for crediting for the subsequent monitoring interval.

Data / Parameter:	$EC_{TOT, BSG, k, y}$
Data unit:	kWh
Description:	Total electricity consumption of household *k* during the monitoring interval *y*, where *k* are the households included in the BSG during monitoring interval *y*.
Source of data to be used:	Electricity invoices, provided either by the households or by the electricity supply company.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Collect data for each monitoring interval *y*
Description of measurement methods and procedures to be applied:	Reading of electricity consumption meter Adjust the total electricity consumption from the time period indicated the electricity invoices to the monitoring interval y, using the mean daily electricity consumption. The mean daily electricity consumption is derived from the electricity consumption invoice and applied to the monitoring interval *y*. The data is collected for each monitoring interval *y*.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$EC_{TOT, PSG, l, y}$
Data unit:	kWh
Description:	Total electricity consumption of household *l* during the monitoring interval *y*, where *l* are the households included in the PSG that have received light bulbs (CFLs), from the project participant prior to the start of the spot check (i.e. the date of the first visit of a household during the spot checking period) that was undertaken at the beginning of the monitoring interval *y*.
Source of data to be used:	Electricity invoices, provided either by the households or by the electricity supply company.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Collect data for each monitoring interval *y*
Description of measurement methods and procedures to be applied:	Reading of electricity consumption meter Adjust the total electricity consumption from the time period indicated the electricity invoices to the monitoring interval y, using the mean daily electricity consumption. The mean daily electricity consumption is derived from the electricity consumption invoice and applied to the monitoring interval *y*. The data is collected for each monitoring interval *y*.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$EC_{TOT, BCCG, s, y}$
Data unit:	kWh
Description:	Total electricity consumption of household *s* during the monitoring interval *y*, where *s* are the households included in the BCCG during the monitoring interval *y*.
Source of data to be used:	Electricity invoices, provided either by the households or by the electricity supply company.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Collect data for each monitoring interval *y*
Description of measurement methods and procedures to be applied:	Reading of electricity consumption meter Adjust the total electricity consumption from the time period indicated the electricity invoices to the monitoring interval y, using the mean daily electricity consumption. The mean daily electricity consumption is derived from the electricity consumption invoice and applied to the monitoring interval *y*.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$EC_{TOT, PCCG, t, y}$
Data unit:	kWh
Description:	Total electricity consumption of household *t* during the monitoring interval *y*, where *t* are the households included in the PCCG during the monitoring interval *y*.
Source of data to be used:	Electricity invoices, provided either by the households or by the electricity supply company.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Collect data for each monitoring interval *y*
Description of measurement methods and procedures to be applied:	Reading of electricity consumption meter Adjust the total electricity consumption from the time period indicated the electricity invoices to the monitoring interval y, using the mean daily electricity consumption. The mean daily electricity consumption is derived from the electricity consumption invoice and applied to the monitoring interval *y*. *y*.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$n_{BCCG, y}$
Data unit:	-
Description:	Total number of households *s* included in the BCCG during the monitoring interval *y*.
Source of data to be used:	The number is determined by the project participant and is available with the calculation of the emission reductions for each monitoring interval y.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 for the first monitoring interval y
Description of measurement methods and procedures to be applied:	The number is determined for each monitoring by the project participant.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$n_{PCCG, y}$
Data unit:	-
Description:	Total number of households *t* included in the PCCG during the monitoring interval *y*.
Source of data to be used:	The number is determined by the project participant and is available with the calculation of the emission reductions for each monitoring interval y.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 for the first monitoring interval y
Description of measurement methods and procedures to be applied:	The number is determined for each monitoring by the project participant.
QA/QC procedures to be applied:	All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	$n_{SCRAP, y}$
Data unit:	-
Description:	Number of scrapped light bulbs handed in by households
Source of data to be used:	Project participants choice
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The distribution process is done house by house and the returned active light bulbs will be destroyed directly on-site. to prevent reuse. The number of returned and scrapped light bulb is gathered by the distribution team with standard form for each household. The complete standard forms of all households are kept on one place The destroyed lamps will be forwarded to CENEL and the returned metal sockets of the incandescent light will be counted. The number of returned metal sockets has to match the number of hand out CFLs. The number of returned sockets and handout CFLs will be recorded via forms per project area and the essential information is recorded electronically.
QA/QC procedures to be applied:	The number of distributed CFLs will be compared with the number of scrapped light bulbs. The independent organisation (e.g.AMDE Corp.) is observing • That the number of distributed CFLs corresponds with the number of returned destroyed active light bulbs. The handover of the metal socket will be done in the presence of a community leader and lawyer ("notario publico"). The handover to the recycling company will be documented via delivery note confirmed by the recycling company and CENEL. • the scrapping of returned incandescent light bulbs.. The destruction on-site will be observed by the independent organisation via unheralded inspection. The result of the inspection will be recorded via report. The prepared report will be available after the distribution. All data will be stored 3 years after the end of the crediting period.
Any comment:	-

Data / Parameter:	**TDL_y**
Data unit:	-
Description:	Technical distribution losses in the electricity grid serving the household consumers that participate in the project during the monitoring interval *y* (kWh of technical electric losses in the electricity grid / kWh of electricity supplied to final consumers).
Source of data to be used:	The technical distribution losses of the national grid SNI is calculated by CONELEC (www.conelec.gov.ec) and CENACE (www.cenace.gov.ec). Ex-post calculation: The latest official published value at the final point of the monitoring interval will be applied Ex-ante calculation Refer to the following report: Estadistica del Sector Electrico Ecutariano, year 2007 chapter 1 page 49 D: perdidas en distribucion (6) Download: Boletín Año 2007 Capítulo 1.- Introducción y Resumen http://www.conelec.gov.ec/calculopago.php?menu=41&submenu1=77&idiom=1
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Published report by CONELEC
QA/QC procedures to be applied:	-
Any comment:	Only the technical losses factor will be considered.

B.7.2 Description of the monitoring plan:

>>

The monitioring plan descripes managment procedures to be implemented by the project participant in addition to the project implementation to gurantee consistent project procedures as well as monitoring and reporting of data required for the calculation of emission reductions (ERs).

A coordination manager with team, located at Quito, is appointed to organise all procedures and requirements according to this monitoring plan and supervised all involved stakeholder and parties during the crediting period. The project co-ordination team of the project participant are responsible and organise:

- Quality handbook
- The establishment of transparent systems for the collection, computation and storage of data, including adequate record keeping and data monitoring systems.
- Setting internal auditing procedures for data verification consistent with CDM requirements
- Setting up a regular reporting system meeting internal and external requirements
- Establishing quality control procedures for all monitoring parameters
- Evaluating training needs and carrying out training programs
- Database system administration
- Website administration
- Contact point for stakeholder
- Calculation and reporting of CERs generated by the project activity

At the beginning of the crediting period, the project coordination team setp up a quality management handbook to ensure reliable and transparent data collection including detailed procedure instructions,data forms that are used to document all procedures undertaken and required for project and data collection and protocols which are applied to ensure a good level of quality assurance. The project participant has to determine the start date as well as the end date of each monitoring interval.

All monitored data will be kept via electronic database. A complete extract of the database will be made available to the DOE and the EB with each monitoring report. All data will be stored 3 years after the end of the crediting period.

During monitoring, the provisions as outlined in the baseline methodology, in particular step 9, apply.

Monitoring involves, inter alia, the collection of the following data:

- Ex-post determination of the technical distribution losses;
- Ex-post identification of the number of households that have received efficient light bulbs from the project participant in the time period between the start of the project activity until the start of the spot check (i.e. the date of the first visit of a household during the spot checking period) that was undertaken at the beginning of the monitoring interval *y*.
- Spot-checks at all households BSG and PSG, according to the provisions in the baseline methodology, and ex-post calculation of the electricity consumption for lighting of each sampled household;
- Ex-post collection of data on the total electricity consumption of households in the PSG, BSG,PCCG and BCCG, comparison of the means, application of a T-test and calculation of the *f*;
- Ex-post calculation of the mean and standard variation of electricity consumption in the BSG and the PSG and ex-post calculation of emission reductions.

All energy measurement meters for lighting consumption will be calibrated and regularly maintained and checked for its functioning according to manufacturer's specification and the international standards . EN50470-1[27] and EN50470-3[28]

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

>>
Date of Completion 31/12/2009

Person/entity determining the baseline and monitoring methodology :
Clemens Plöchl, Wolfgang Wetzer;
Energy Changes GmbH
Zip code + city postal address: Obere Donaustraße 12/28, 1020 Vienna
Country: Austria
Telephone number: Wolfgang Wetzer +43/019684529; Clemens Ploechl +49 170 4791790
Fax number: +43/019684529
Email: clemens.ploechl@energy-changes.com; wolfgang.wetzer@energy-changes.com
Company-website: www.energy-changes.com

Person/entity determining the baseline and monitoring methodology :
Milena Velastegui
Smt Asesor Cia. Ltda.
Zip code + city postal address: Grecia N32-112 y La Granja Quito, Pichincha 593, Quito
Country: Ecuador
Telephone number: +59/32246359
Email: mvelastegui@smtasesor.com
Company-website: www.smtasesor.com/

[27] EN 50470-1: Electricity metering equipment (AC) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)

[28] EN 50470-3: Electricity metering equipment (AC) – Part 3: Particular requirements. Static meters for active energy (class indexes A, B and C)

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

28/12/2007 First payment for the purchasement of the CFLs (Statement of account by the National Bank of Ecuador – booking number 755-2219)

C.1.2. Expected operational lifetime of the project activity:

>>

10 years and 8 months

The lifetime of the provided CFLs is 8,000 hours at minimum. The operational hours depend on each household use. Based on daily light consuming of approximately 4 hours, the CFL will take 5,4 years at least. The government provides a second CFL type for every end-of-life CFL within the crediting period. Therefore the installed light appliances fitted with CFLs can be accounted with 16,000 hours and an operational lifetime of near 11years.

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/01/2011 but not earlier than registration

C.2.2.2. Length:

>>

10 years

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

The distributed CFLs contain a maximum amount of 5mg mercury according to the procurement specification. Samples of the the cargos will be taken and tested in accordance to norm IEC 60969 and IEC 60901 by an independent entity. This test encompasses the meauresment of the mercury quantity , too. These tests guarantee the defined mercury content of 5mg.

The end-of-life CFLs by the household will be collected by the electrical distribution company. The collected end-of-life CFLs will be forward to a registered recycling company, which operates under a legal license issued by the Ministery of environment. A recycling company will be contracted, when the end-of-life CFLs will be forward to the disposal process. The collected end-of-life CFLs will be disposed via an appropriate landfill or recycling process by a registered recycling company. The appropriateness of the disposal measurement will be confirmed by a public authority. The way of end-of-life CFLs, from the household to the disposal process, will be recorded via forms. A copy of the completed forms will be kept by the centralized monitoring center and will be available after each monitoring interval for the verifying DOE.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The distributed CFLs contain a low amount of 5mg mercury at maximum. The disposal of the end-of-life CFLs will be done by a registered recycling company. The appropriateness of the disposal measurement will be confirmed by a public authority in accordance to the legal requirements of Ecuador to avoid any kind of negative environmental impacts. The process from the household to the disposal is reported via forms. The completed forms of the disposal process will be available after each monitoring interval for the verifying DOE.

SECTION E. Stakeholders' comments

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E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The project participant announced a website http://www.focosahorradoresecuador.com/ to inform the population of Ecuador about the countrywide distribution of 6,000,000 CFLs as CDM project activity. The website offers a comment opportunity and survey for eligible project activity households. The website is part of the project activity communication plan (refer to Annex 5). All involved stakeholder were informed by national and local media communication via TV, radio, emails, internet and newspaper. A list of of stakeholders contacted via email will be given as additional evidence to the DOE. The CLF will be distributed to households, which want to participate by themselves only.

E.2. Summary of the comments received:

>>

One Stakeholder request refers to the distribution process and disposal process of CFLs. The request will be provided as additional evidence to the DOE.

E.3. Report on how due account was taken of any comments received:

>>

The stakeholder request was replied via email. The thematic of the request and corresponding answer were implemented in the Website http://www.focosahorradoresecuador.com/ - preguntas frequentes, too The reply will be provided as additional evidence to the DOE.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Ministerio de electricidad y energia renovable (Ministry of Electricity and Renewable Energy)
Street/P.O.Box:	Ed. Correos del Ecuador, Av. Eloy Alfaro N029-50 y 9 de Octubre
Building:	
City:	Quito
State/Region:	Pichincha
Postfix/ZIP:	171203
Country:	Ecuador
Telephone:	00059-3976000
FAX:	
E-Mail:	info@meer.gov.ec
URL:	www.meer.gov.ec
Represented by:	
Title:	Eng.
Salutation:	Mr.
Last Name:	Espinoza
Middle Name:	
First Name:	Juan
Department:	
Mobile:	
Direct FAX:	
Direct tel:	0059-3976000 - 1442
Personal E-Mail:	csagasti@meer.gov.ec

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Deutsche Bank AG, London Branch
Street/P.O.Box:	1 Great Winchester Street
Building:	Winchester House
City:	London
State/Region:	
Postfix/ZIP:	EC2N 2DB
Country:	United Kingdom
Telephone:	0044 207 547 3347
FAX:	0044 207 547 4468
E-Mail:	david.costa-dsa@db.com
URL:	www.db.com
Represented by:	David Costa D'sa
Title:	
Salutation:	Mr
Last Name:	Costa D'sa
Middle Name:	
First Name:	David
Department:	Environmental Financial Products
Mobile:	
Direct FAX:	0044 207 547 3347
Direct tel:	0044 207 545 7893
Personal E-Mail:	david.costa-dsa@db.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties for this Project.

Annex 3

BASELINE INFORMATION

The estimation of the baseline is based on the load curve of lighting consumption during a representative day. The following aggregated load curves were provided by the following electrical distribution companies:

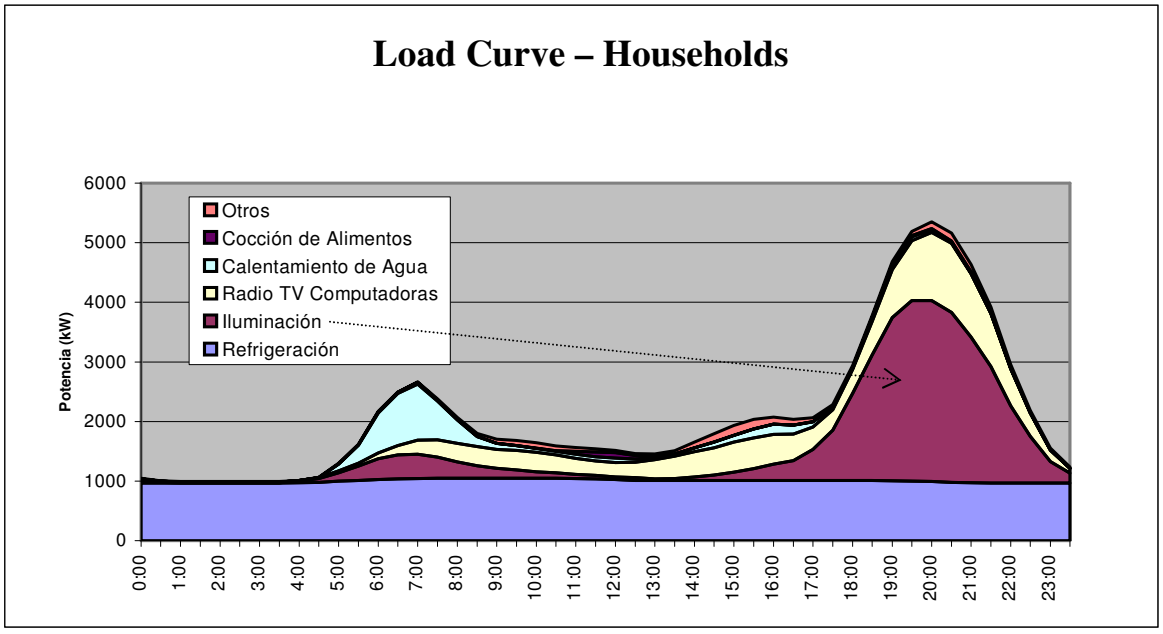
- AZOGUES
- CATEG
- CENTROSUR
- EMELNORTE

The curve, which shows the lighting consumption during a representative day is marked within the diagram.

Reference: PROMEC, Consultoria en Eficiencia Energética. Proyecto "Sustitución de lámparas incandescentes por fluorescents compactas en el Sector Residencial." Anexo 7.1

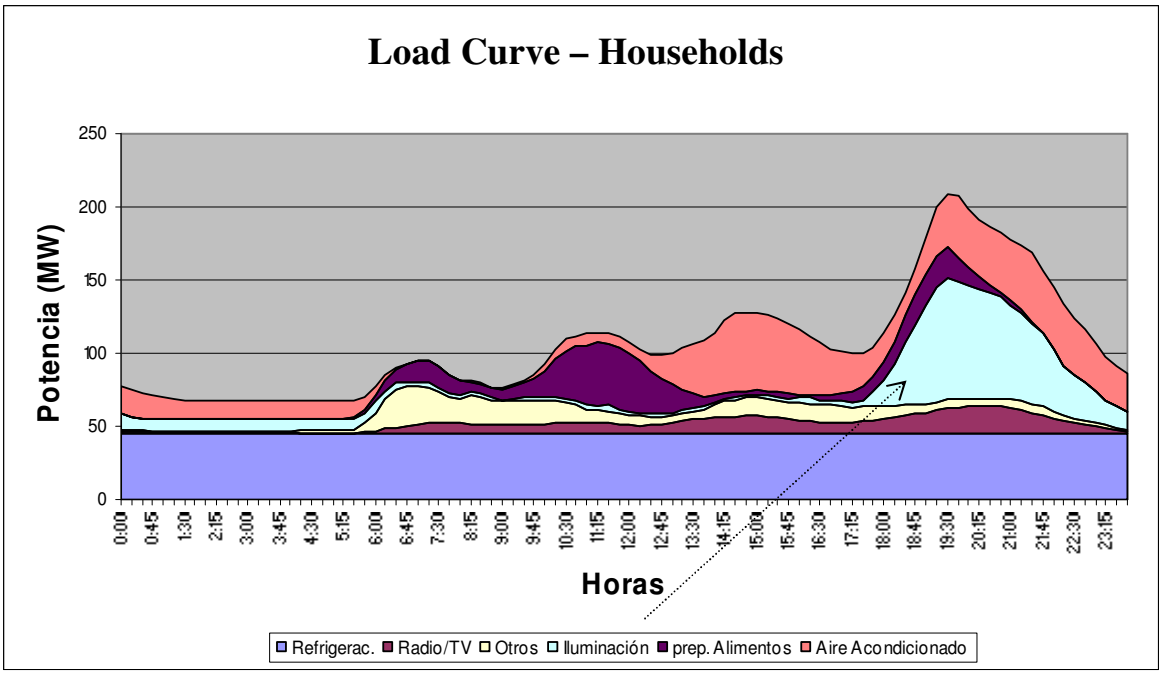
Load curve households:

AZOGUES

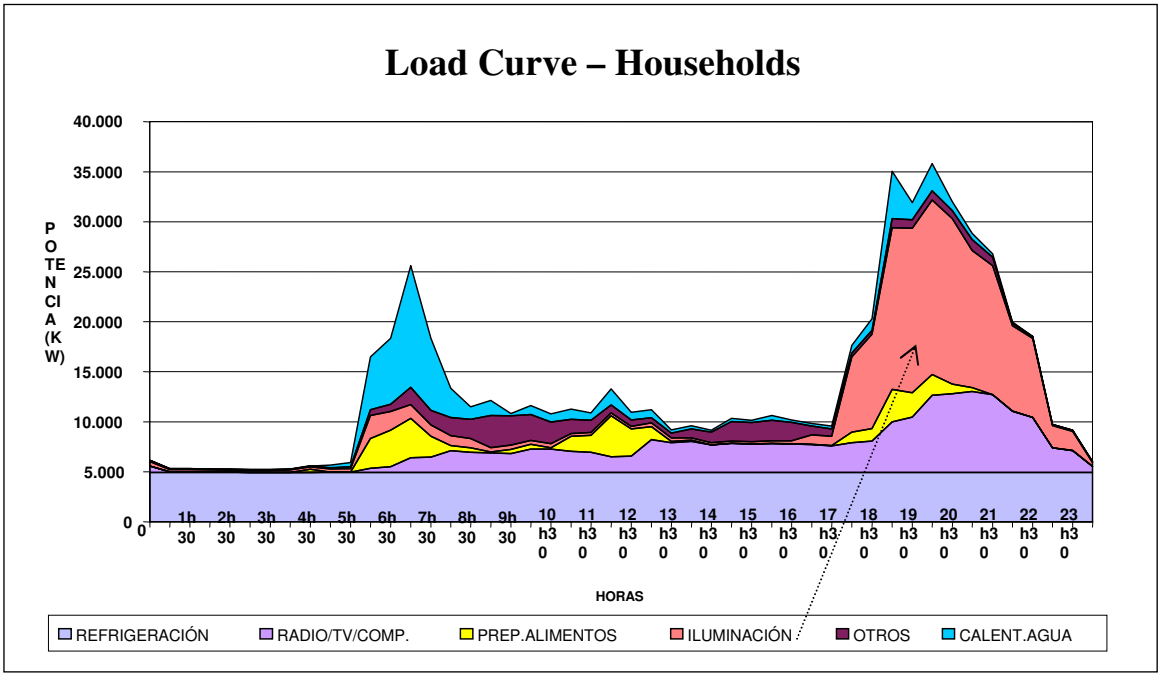


BASELINE INFORMATION

CATEG:

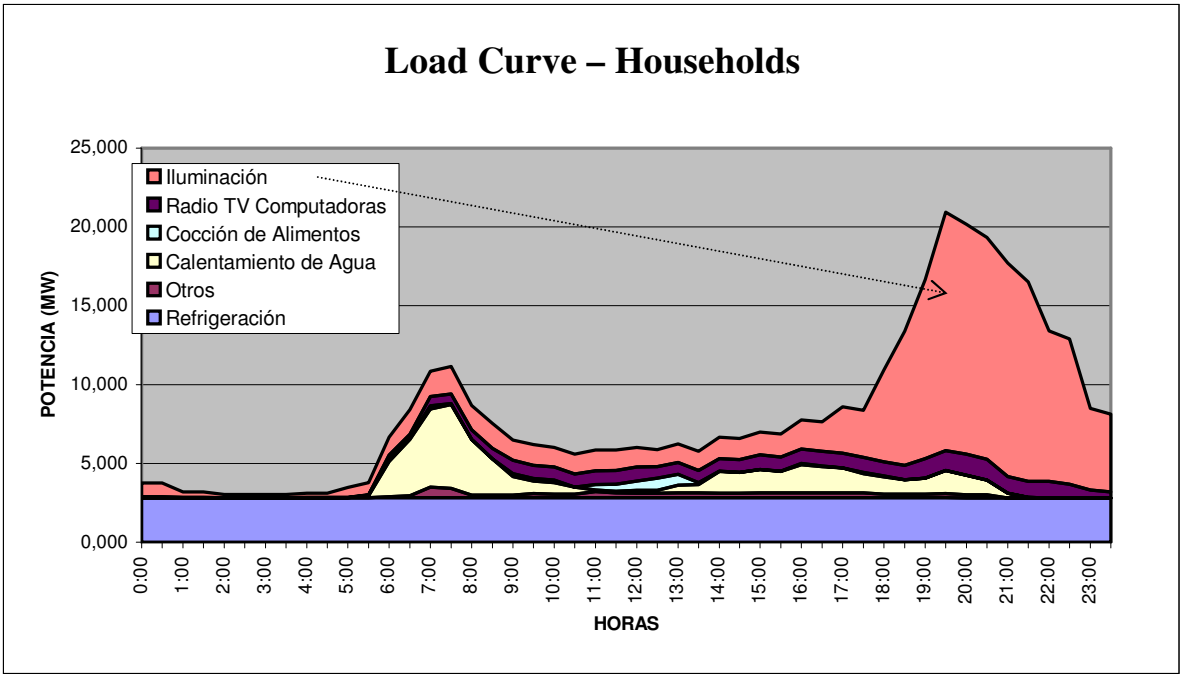


CENTROSUR



BASELINE INFORMATION

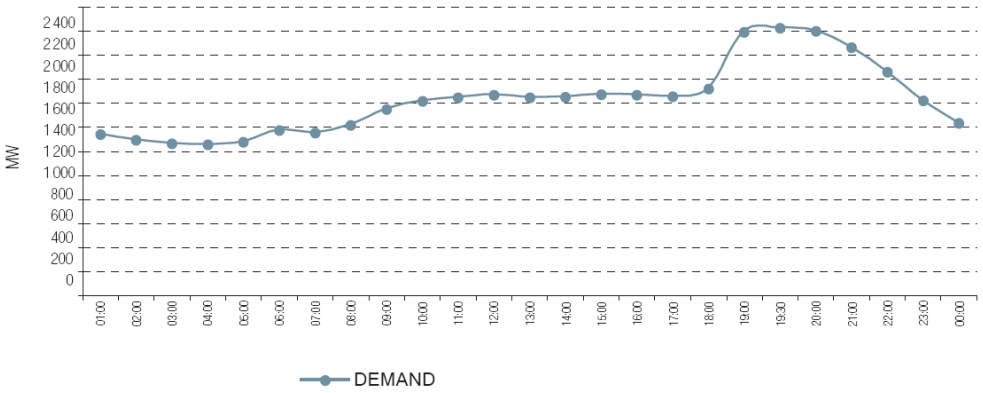
EMELNORTE



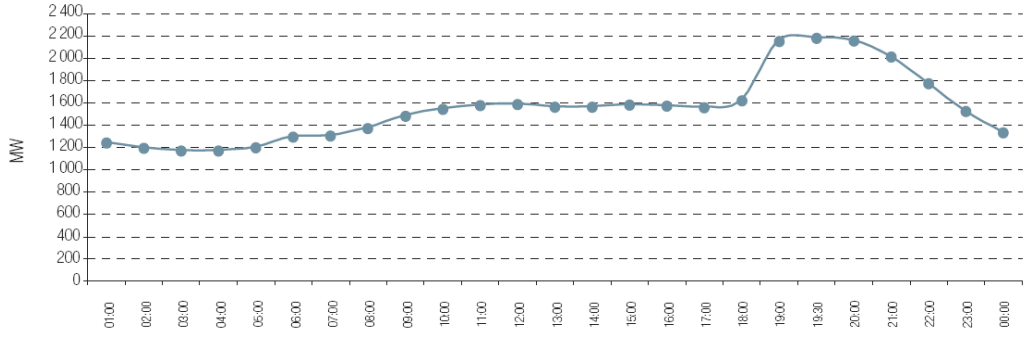
Average monthly demand curve of representative season months

There are no significant seasonal variations of electricity demand during a year. Therefore seasonal variations are negligible for the lighting consumption.
Reference: Cenace Annual report 2005; "informe anual - annual report 2005" page 81 – 83

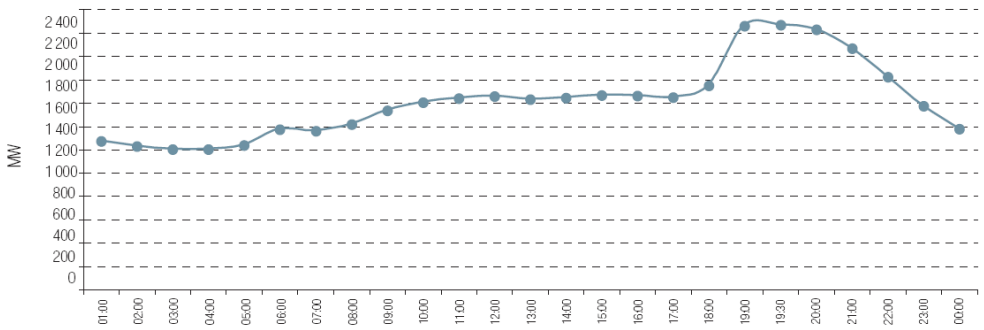
March



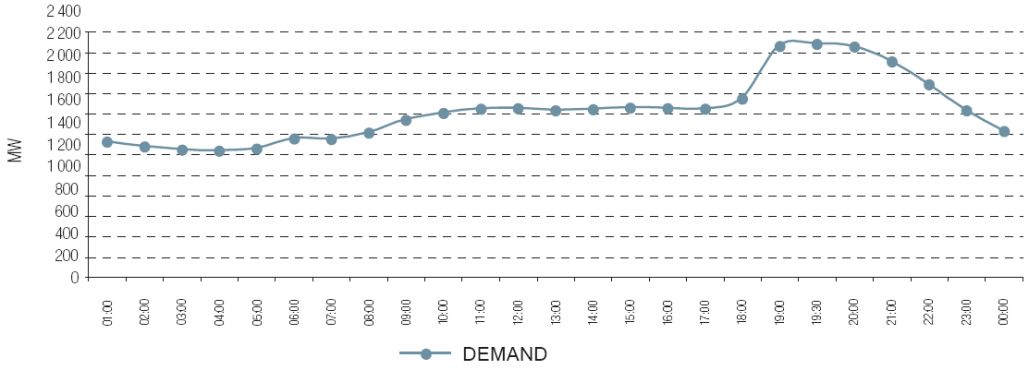
June



September



December



BASELINE INFORMATION

Baseline ex-ante calculation

The ex-post calculation of emission reduction will be done via the listed formula under Step 14 (B.6.1 Emission reductions). These data are not available ex-ante, thus the baseline ex-ante calculation is based on the following assumption:
According to the load curves, the peak hour of lighting consumption is at 19:30. The calculation take the time between 18:00 and 22:00 hours into account, and the morning hours will not be accounted. Based on the geographical position of Ecuador and the same demand over the year, the 4 hours were assumed for each day. The numbers of used 100W incandescent lights are accounted with 4 units.

The ex-ante calculation is based on the following data:

- Number of households eligible for calculating emission reductions: 1.500.000
- 10%[29] error rate (households are not eligible however receive CFLs): 150000
- 4 units installed 100W incandescent light bulbs (Baseline)
- 4 units installed 20W CFLs (Project activity)
- 4 hours of lighting consumption per day
- Emission factor 0.63956t CO_{2eq}/year

Baseline emissions:
(1,500,000 households- 150000 households) x 100W x 4bulbs/household x 4h/day x 365 days/year x0.63956 tCO2/MWh = 504,229tCO_{2eq}/year

[29] During the distribution housholds could potentially receive CFLs in state of 60W lamps and thus these households are not eligible under the project activity. This circumstance is estimated between 1-3% by the experience of the electrical distribution companies and can be determind after the distribution process only. Therefore, for the emission reduction calculation, ex-ante, this circumstance is considered with 10% error rate as conservative approach.

Annex 4

MONITORING INFORMATION

Refer to B.7.2 Description of the monitoring plan:

Annex 5

PROJECT ACTIVITY COMMUNICATION PLAN

1. **EVENTS**
   1.1. Official launching of the CFL project activity
   1.2. Special events for the CFL installation 1,2,3,4,5 million with the participation of special guests (Government authorities, celebrities).
   1.3. Installation of the 6 million CFL under the presence of the Minister of Electrical and Renewable Energy and the President of Ecuador.

2. **NATIONAL PUBLICITY CAMPAIGN**

The countrywide communication program takes place before, during and after the CFL distribution via radio, press, internet and television.

2.1. Phase 1: (Before)
Ex-ante publicity campaign, oriented to inform and report about the advantages of the CFL in comparison with the conventional incandescent light bulbs; as well the economical and environmental benefits for the consumers.

2.2. Phase 2: (During)
Informative Campaign about the Project, with precise data about the objectives, results, as well as, principia about the beneficiaries and the distribution schedule,

2.3. Phase 3: (After)
Publicity Campaign for the promotion of the expected results that will be integrated after the required time to reduce the generated impact of the installation of the six million CFL. The indicators for evaluation are: Energy demand diminution; general electricity saving; reduction of the cost of the electricity bill for the population (including testimony of the beneficiary) calculation of the reduction of CO_2 emissions.

2.4. Accompanying Actions
   2.4.1. Week Press conference with the presence of the Ministry of Electricity and Renewable Energy, to inform the national media about the progress of the CFL distribution and next steps.
   2.4.2. Media Interview for the promotion of the Project and their benefits, tied with the government policy to improve and enforce energy efficiency for households at every level.
   2.4.3. Permanent Press Bulletin for the show step by step the accomplished activities by the Project of massive substitution of six million CFL.
   2.4.4. Brochure with information about the CFL, with characteristics techniques, advantages, economical, social and environment benefits for the consumer and population of Ecuador.

3. COMUNICATION CAMPAIGN VIA LOCAL MEDIA

The campaign will be done by local radio of the distribution area, with specific information about: Date, tour, route of the CFL distribution, relating procedure, conditions of use of the lighting.

3.1. Accompanying actions at local level.

3.1.1. A couple of days before the CFL distribution starts in the resp. area, the household will be contacted by phone.

3.1.2. Informative Flyer, - Each household receives an information flyer with technical specifications, usage, comparative benefits, as well as recommendations and obligation for executive care.

3.1.3. Press Conference: Each electrical company distributor, prior the beginning of the CFL distribution, arranges a press conference to inform the local media about the project activity.

3.1.4. Energy Efficiency Road show to demonstrate the advantage of CFLs

3.1.5. Travels with different media representatives to report the project activity.

4. CALL CENTER:

A team will be in charge to answer all questions regarding the project activity

Annex 6

PROJECT ACTIVITY IMPLEMENTATION PLAN

Annex 6 is provided as additional evidence to the DOE

Annex 7

DETERMINATION OF THE PROJECT AREAS

Geographical boundary of each project area i via geographical coordinates

Annex 7 is provided as additional evidence to the DOE