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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

Project: Electricity grid interconnection San Gabán – Mazuko – Puerto Maldonado
Version: 02.
Date: 10/04/08

A.2. Description of the project activity:

The main objective of the project "Electricity grid interconnection San Gabán – Mazuko – Puerto Maldonado"[(1)] is the construction of a transmission electric line between San Gaban (Puno) and Puerto Maldonado (Madre de Dios). The project activity is to be developed by Electro Sur Este SAA (ELSE). The transmission line will be built in such a way that isolated systems located between San Gaban and Puerto Maldonado will be connected to the Peruvian National Interconnection Grid System (SEIN) making available electricity from the grid for consumption of the current and future users located inside the boundary of the isolated system.

Electro Sur Este S.A.A. (ELSE) is a distribution company with capital majority from FONAFE (Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado - National Fund of Financing Government Activities)[(2)] in which Peru's government has a capital majority share. ELSE is ruled by a private regime and its expenses, investments and projects are to be covered by profits from its own activities.

Electro Sur Este S.A.A. (ELSE), currently has the concession of distribution activities and the secondary distribution system in the following regions: Cusco, Apurimac y Madre de Dios, the last one with isolated thermal generation in Tambopata y Tahuamanu. Installed capacity as to 2005 in Madre de Dios isolated system was as follows: 7,11 MW in Puerto Maldonado, 2,08 MW in Mazuko and 5,24 MW in the mining companies. Current installed capacity is mainly fuelled by Diesel generators, operating with low energy efficiency technologies and consequently intense carbon emissions. Electricity supply in the region is likely to have unexpected shortages and tension drops. Additionally, electricity cost for end users is one of the highest in the country.

The project activity will reduce approximately 16.551,98 tonne CO_2e/year by implementing two main actions:

(i) Displacement of fossil fuels through shutting down each fossil fuel fired power plant, and,

(ii) Electricity consumption from SEIN in which 70%[(3)] is supplied from hydroelectricity generation.

The project activity "Electricity grid interconnection San Gabán – Mazuko – Puerto Maldonado" is

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(1) Includes the following isolated systems: Puerto Maldonado (TPP Puerto Maldonado, TPP Iñapari y TPP Iberia), Mazuko and small stand-alone individual plants from mining businesses.

(2) Law 27170. Law by which FONAFE is created. b) Regulation from law 27170, approved by D.S. 072-2000-EF.

(3) Source: Annual statistics: 2005, Ministry of energy and mining from Peru (MINEM) http://www.minem.gob.pe/electricidad/pub_anuario2005.asp

part of the complementary transmission System included in the Transitory transmission Plan [4] 2007 – 2008; this means that the implementation of the project activity is the result of an initiative from one or multiple agents (with no public investment), as in this case an Else's initiative.

The Project activity contributes to sustainable development in the region in various ways:

- Supplying cleaner energy from the grid to meet the energy demand, and in particular meeting the foreseen growing energy demand from residential, commercial and industrial users (mainly mining companies).
- End users will benefit from a tariff reduction [5] and hence access to electricity with competitive prices increases possibilities of developing productive activities in the region such as gold mining, tourism, fishing, cattle and forest and agroforest potential.
- The Project activity will contribute to the reduction of emissions of local pollutants as NOx and SOx and PM at the site of the Project due to the elimination of fossil fuel use.
- There will be reduction in CO_2 emissions as the operation of the project activity will use electricity generation from the national grid (more than 50% hydroelectric) that would otherwise be produced from polluting fossil fuels.

A.3. Project participants:

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)
Peru (host)	Electro Sureste S.A.A.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Peru

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

[4] Study that identifies the transmission equipment requirements in SEIN (takes into account its service quality). Law to guarantee the efficient development of electricity generation (Law 28832, 21st definition). Refer to annex 3 for details.

[5] Clients from electric system Madre de Dios will benefit from a reduction of approximately 37% from the current tariff of isolated thermal generation. Mining businesses in Mazuko would have a 15% cost reduction compared to that of stand alone isolated thermal generation. .

Region: Puno and Madre de Dios, Carabaya and Tambopata provinces.

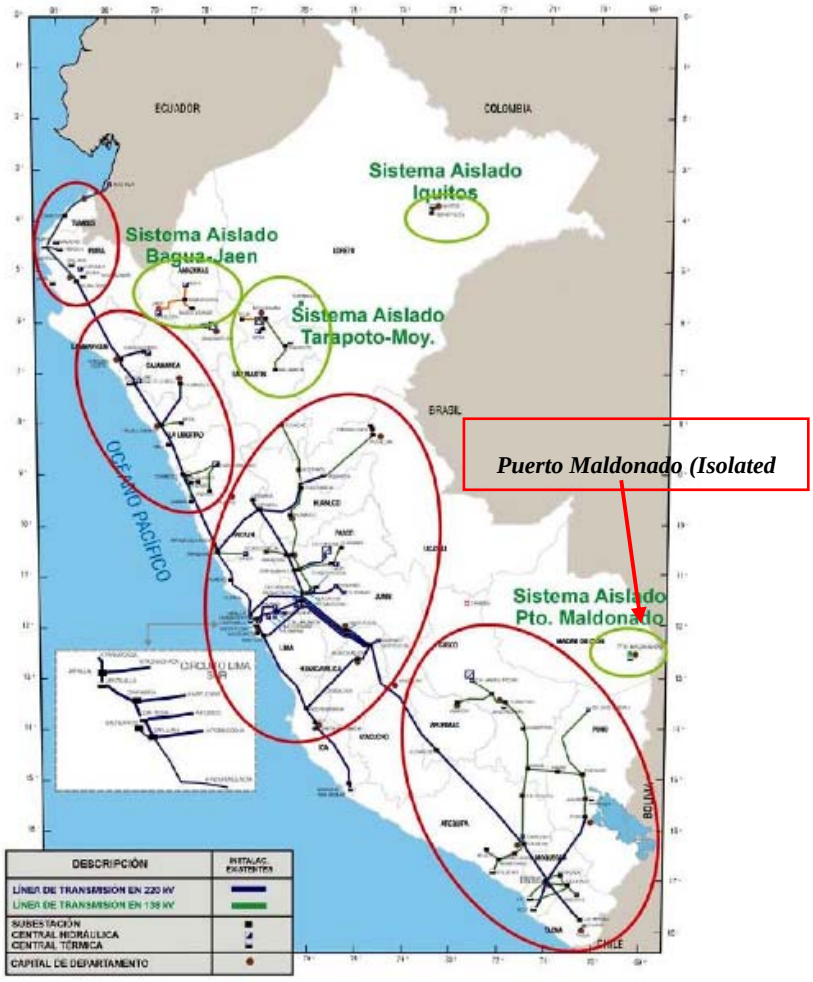
A.4.1.3. City/Town/Community etc:

Puerto Maldonado (capital city of Madre de Dios), Tambopata province district.

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

The project will be located in the regions of Puno and Madre de Dios in southeastern Peru. The electric line is to be built along the following coordinates: 341691E, 8490823N; 341691E, 8606937N; 479581E, 8606937N y 47981E, 8490823N.

Project activity site layout



Note: Sistema Aislado = Isolated System

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

Scope Number: 1

Sectoral Scope: Energy industries (renewable - / non-renewable sources)

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

The project activity proposes the use of the most appropriate technology for the electric energy transmission and distribution.

The implementation of the project will allow not only reducing emissions of GHG to the atmosphere but also reduce the emission of local pollutants i.e. SO_2, NO_X, VOCs.

The components of the project are:

- San Gaban power substation

  - Substation cell enlargement (138 kV)

- Transmission line San Gaban – Mazuko: 138 kV, length: 68km.
- Mazuko Substation

  - 01 Power transformer of 138/66/33kV 20-26/12.3-16/8-10.5 MVA

  - Substation cells: 138 kV, 66 kV and 33kV

- Transmission line Mazuko – Puerto Maldonado 66 kV (Section I) length: 26.7 km.
- Transmission line Mazuko – Puerto Maldonado 66 kV (Section II) length: 125.9 km.
- Transmission line Mazuko – Puerto Maldonado 66 kV (Section III) length: 5.3 km.
- Puerto Maldonado Substation

  - Located at then of the 66kV transmission line

  - 01 Power transformer of 66/33/10kV-16-12,3/3,9-5/12,3-16MVA

  - Substation cells: 66 kV, 33 kV

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

Emissions reductions over the first crediting period

Year	Annual estimation of emission reductions in tonnes of CO_2e
2 008	6,433
2 009	6,714
2 010	7,005
2 011	25,021
2 012	25,723
2 013	26,442
2 014	27,398
Total estimated reductions (tonnes of CO_2e)	**124,736**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**17,819**

A.4.5. Public funding of the project activity:

No public funding has been sought for the project activity and entire investment (100%) is from the project proponent: Electro Sur Este S.A.A. (ELSE).

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:

The chosen baseline methodology and monitoring methodology applicable for the Project activity is the approved methodology: AM0045 - version 1.1: "Grid connection of isolated electricity systems" valid since 22nd of December 2006.

The methodology document can be found at:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

This methodology also refers to the ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources - Version 6" and "Tool for the demonstration and assessment of additionality" – Version 4, in order to determine the additionality of the project activity.

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

The chosen methodology is applicable to project activities consisting of:

Project Activities considered in AM0045	Fulfillment by the Project Activity
The expansion of an interconnected electricity grid to isolated systems	Isolated systems in Madre de Dios: Puerto Maldonado, Mazuko and loads from mining in Huepetue - Mazuco will be connected to the National Interconnected System from Peru (SEIN).
The displacement of power generation in isolated systems by more efficient, less carbon intensive power generation from the interconnected grid.	The growing electricity demand will be covered by the project activity. End users will have better service and non unexpected shortages. As mentioned, fossil fuels will be displaced and thus power generation will be less carbon intensive (SEIN has more than 50% hydro power generation).

As explained above, the project activity is in compliance with the activities as determined in the methodology, therefore the proposed project falls under the chosen methodology.

The methodology is applicable under the following conditions:

Applicability Conditions of AM0045	Fulfillment by the Project Activity
Emission factors estimated take into account the increase of demand of the isolated systems and the remaining lifetime of the equipments.	Baseline emissions factors were estimated considering both; increase of demand and remaining life of the equipments

Renewable energy based electricity generation in the isolated systems is not displaced and its operation is not significantly affected.	It has been verified that there is not currently any renewable energy based electricity generation system within the isolated systems.
All fossil fuel fired power plants in the isolated system are 100% displaced.	The total of fuel fired power plants in the isolated system (100%) will be displaced.

Conditions are met by the project activity, therefore the methodology is applicable.

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

The project activity is the construction of a transmission line to connect the isolated systems to the interconnected national grid (SEIN)

Transmission line path

- The boundary of the project includes power plants connected to the Puerto Maldonado isolated system: Puerto Maldonado, Iberia, Iñapari, Mazuko and small power plants from the mining companies

- The emissions from the project activity are:

  - Those due to the electricity generated by the interconnected national grid. The source of these emissions are the existing fossil fuel power plants operating in the National grid (SEIN)

  - SF_6 emissions due to possible losses in the new installations (switches, cells and encapsulated substations)

- The baseline emission will include only:
  - Emissions from the power plants connected to the isolated system. The emission would be estimated taking into account the increase of the demand over the time and the remaining lifetime of the existing power plants.

The SEIN is not connected to other electric grids (The country does not import electricity)

	Source	Gas	Included?	Justification/explanation
Baseline	Power generation	**CO_2**	**Yes**	**Main emission source**
		CH_4	No	Excluded for simplification. This is conservative. .
		N_2O	No	Excluded for simplification. This is conservative.
Project activity	Power generation	**CO_2**	**Yes**	**Main emission source**
		CH_4	No	Excluded for simplification.. This emission source is assumed to be very small. .
		N_2O	No	Excluded for simplification.. This emission source is assumed to be very small.
	Emissions from the new equipments of the project activity	**SF_6**	**Yes**	**Emissions related to SF_6 used in the new equipments of the project activity.**

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

The baseline scenario is determined through the following steps:

Step 1. Identification of realistic and credible alternative scenarios that are consistent with applicable mandatory laws and regulations.

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

There are various options that can be chosen as possible alternative scenarios to supply electricity to isolated systems, among them:

- *Thermal generation using natural gas from CAMISEA*. A government's plan to extend natural gas use in every sector in Peru has been put in place. In line with it, it is determined that electricity generation sector has economic incentives through lower natural gas prices. As a complementary measure, a regulatory framework for cogeneration has recently been established in order to promote diffusion of this technology and conditions in which cogeneration participates in the electricity market have been set. Therefore, cogeneration plant owners/developers can obtain the

benefits derived from the lower natural gas prices applicable to electricity sector participants. Nevertheless, in order to have access to such benefits, the cogeneration plant should be located within the range area of gas pipelines, the supply should be feasible and the technology is expected to be suitable for natural gas use as fuel.

- *Rural electrification with renewable energy.* Only small scale renewable energy projects such as small hydropower plants and solar home systems have been developed in Peru. Large scale projects have been constrained by the risks associated with the nature of the project and the high initial investment costs.

- *Electricity supply through the expansion of the transmission system.* Regulatory framework establishes the conditions to promote competitive generation prices within the transmission system SEIN and encourages the system participants to deliver electricity to isolated areas while maintaining the quality of the service. As a result, the recently adopted transmission plan [(6)] identifies those priority projects as part of the "Guaranteed Transmission system [(7)]," while projects promoted as individual initiatives from one or more agents with no public funding are classified as part of the Complementary transmission system. [(8)].

Project alternatives should be realistic, plausible and credible. Taking into account the above mentioned, it can be concluded for each alternative the following:

- *Electricity supply with renewable energy and a transmission line:* - given the risks and high up front costs arising from this kind of project, this option is neither realistic nor credible.

- *Electricity supply-generation using natural gas:* It is unlikely that this alternative will take place considering the distance between the gas pipelines and the project area (approximately 400 km). Clearly, investment costs both for the pipeline and the cogeneration plant (with the required technology) would make the project unfeasible given the rather small natural gas demand in the area.

  – *Grid connection of isolated electricity systems within the guaranteed transmission system not undertaken as a CDM project activity.* The project is currently classified under the complementary transmission system because it is not a government's priority. Consequently, it is very unlikely that the project could be classified as being part of the guaranteed transmission system in the medium or long term. In the guaranteed transmission system the project would have incentives and subsidies from the government because has certain mandatory nature, and for this reason the project would not faces any investment or technical barrier. This alternative therefore will not be considered since is not real.

- *Grid connection of isolated electricity systems within the complementary transmission system*

[(6)] Periodic study approved by the Ministry in which a centralized analysis is used to establish the transmission equipment requirements necessary to maintain or improve quality, reliability, security or economy of a given system for a period of time not longer than 10 years. The result of this study is a complete plan of infrastructure works which considers all possible expansion scenarios of generation and growth in future demand, time schedule to achieve it and the allocation of compensations.

(7) System comprising all the transmission assets or transmission installations built under the scope of the transmission plan and considered to be an energy priority. This leads to economic and technical support from the Government.

[(8)] Projects outside the scope of the guaranteed transmission system, and thus outside the scope of the transmission plan, although they belong to it, they are to be developed by private initiative.

not undertaken as a CDM project. This is both realistic and credible.

- *Expansion of the actual installed capacity using Diesel as fuel.*- this would be continuation of current activities with incremental capacity expansion in order to meet the growing energy demand.

Sub-step 1b. Consistency with mandatory laws and regulations:
Identified realistic and credible alternative scenarios to the project activity shall be in compliance with all regulatory national requirements.[(9)]. In consequence, considering the analysis made, the following alternatives to the project have been considered:

- **Alternative 1:** *Grid connection of isolated electricity systems within the complementary transmission system not undertaken as a CDM project. This alternative is the CDM project activity without the revenue from the sale of certified emission reductions (CERs).*

- **Alternative 2:** *Expansion of the actual installed capacity using Diesel as fuel.*

Step 2. Investment analysis

Investment analysis is consistent with the guidance in Step 2 of the latest version of the "*Tool for the demonstration and assessment of additionality*" (version 4).

I will be determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs).

The investment analysis has been carried out following the next sub steps:

Sub-step 2a.- ***Appropriate analysis method***

Out of the proposed methods included in the Tool for the demonstration and assessment of additionality (I- Simple cost analysis, II- Investment comparison analysis and III- Benchmarking analysis), the most suitable analysis method for the project activity is option II: investment comparison analysis, since data on investment costs for each alternative is available and is according to the decision making context of the project activity.

Sub-step 2b.- ***Option II Investment comparison analysis***

Identification of the financial indicators

Net present value (NPV) has been selected as the most suitable financial indicator because applies for the evaluation of every alternative of the project and the CDM project activity itself. IRR will be shown only if it applies.

Sub-step 2c. Calculation and comparison of financial indicators

(9) Refer to annex 3: Regulatory framework applicable for the Project activity.

Taking into account barrier analysis, financial indicators have been estimated for alternative 1, 2 and the CDM project activity. In the evaluation of the alternatives have being included all relevant costs and revenues, excluding CER revenues.

Financial indicator for alternative 1, 2 and the project activity with CDM income

Alternative	Net Present Value (US $)(Rate=12%)
Alternative 1. Grid connection of isolated electricity systems within the complementary transmission system not undertaken as a CDM project. (CDM project activity without the revenue from the sale of CERs).	-4,451
Alternative 2. Expansion of the actual installed capacity using Diesel as fuel.	-3,274
Project Activity with CDM income	**-2,974**

According to the financial analysis, it can be concluded that alternative 2 is the most attractive course of action.

Then the CDM project activity (without the revenue from the sale of CERs) can not be considered financially attractive.

Relevant assumptions

The following assumptions have been used in order to make the calculations:

- *Difference in demand patterns for scenarios WITH and WITHOUT the project.* Based on market forecasts from the project proponent (ELSE) the difference is due to:

  (i) WITH the project demand is likely to increase gradually each year as a result of improvement in service quality and lower electricity costs for end users. While on the other hand,

  (ii) WITHOUT the project demand is expected to grow at a lower pace given the fact that it will not be satisfied, quality will not improve significantly and electricity cost for end users is considered to be too high.

- A discount rate of 12% has been used for Net present Value calculations. This rate has been

established by the Ministry of Energy and Mining (MINEM) for every energy-related project assessment. [10]

In the project activity, for instance, investment includes: power lines joining the grid systems, purchase of equipments for each substation (project investment outlay in year 0). From year 1, maintenance costs of equipment are included in the calculations. Electro Sur Este (ELSE) covers all project-related costs.

In alternative *2*- In order to meet the growing energy demand in isolated systems purchase of new equipments has been considered. Operation and maintenance costs are also taken into account for accurate calculations (including those from fossil fuels necessary to run the equipments- diesel 2-).

Differences between assumptions.

Costs differences among proposed alternatives are explained by the specific investments, as summarized in the following table.

Justified differences between assumptions for each proposed alternative

Alternative	Investment differences
Project Activity	Power lines, former substations retrofitting, new substation, purchase and maintenance of new equipments, electricity purchases from distribution company.
Alternative 2	Purchase, operation and maintenance of new equipments. (Additional fossil fuel purchases included)

Comparison of the financial indicators

As has been shown in ***Sub-step 2c***, best financial indicator (NPV) is the one from alternative 3. Consequently, project activity undertaken as CDM is unlikely to be the most financially attractive alternative.

Sub-step 2d. - Sensibility analysis

Sensibility analysis has been carried out taking into account percentage variations in income and cost. Net present values calculated for each alternative are presented in the next tables.

Variation of NPV due to income variation

[10] Article 79º Electricity concessions Law. (Decree -Law 25844)

Variation as a percentage (%) of income	NPV A2 without project	NPV A1 with project	NPV Project with CDM income	IRR Project with CDM income
10.00%	2,559	-822	655	12.6%
5.00%	-358	-2,636	-1,160	10.8%
3.00%	-1,524	-3,362	-1,886	10.1%
1.00%	-2,691	-4,088	-2,612	9.3%
(Original value)	**-3,274**	**-4,451**	**-2,974**	**8.9%**
-1.00%	-3,858	-4,814	-3,337	8.5%
-3.00%	-5,024	-5,540	-4,063	7.7%
-5.00%	-6,191	-6,265	-4,789	6.9%
-10.00%	-9,108	-8,080	-4,063	4.6%

A1: for Alternative 1
A2: for Alternative 2

As can be seen in the table above, reductions and increase in income as a percentage of the original value brings different scenarios where is clear that the best alternative is number 2.

For alternative 1 (project without CDM), the variation of income needed to reach the benchmark (IRR = 12%) is + 12.25%. This variation only in income is not likely to happen since represent that energy tariff can increase 12.25%. A variation in demand is not likely to happen in that magnitude (economic evaluation already considers the growth of population), and will represent more operational costs. According to the Ministry of Economy and Finance (MEF by its acronyms in Spanish), the entity responsible for the economic evaluation of the projects, it is recommended that the variation for a sensibility analysis is ±10%.

Variations in NPV and cost are presented in the next table.

Variation of NPV due to variation of cost

Variation as a percentage(%) of Cost	NPV A2 without project	NPV A1 with project	NPV Project with CDM income	IRR Project with CDM income
10.00%	-9,435	-8,831	-7,355	4.6%
5.00%	-6,355	-6,641	-5,165	6.7%
3.00%	-5,123	-5,765	-4,289	7.6%
1.00%	-3,890	-4,889	-3,412	8.5%
(Original value)	**-3,274**	**-4,451**	**-2,974**	**8.9%**
-1.00%	-2,658	-4,013	-2,536	9.4%

-3.00%	-1,426	-3,137	-1,660	10.3%
-5.00%	-194	-2,261	-784	11.2%
-10.00%	2,886	-70	1,406	13.5%

The outcome of variations in cost as a percentage of the original value is a set of different scenarios from which alternative 2 is the most financially attractive.

For alternative 1 (project without CDM), the variation of income needed to reach the benchmark (IRR = 12%) is – 10.22%. This variation only in costs is not likely to happen since the investment is commonly higuer than the one stablish in the feasibility study (In this project the investment went from 13,4 MM USD to 21 MM USD) and operational costs used in the feasibility study were according to the studies performed by the national energy supervisor entity, OSINERG. According to the Ministry of Economy and Finance (MEF by its acronyms in Spanish), the entity responsible for the economic evaluation of the projects, it is recommended that the variation for a sensibility analysis is ±10%.

In order to demonstrate the necessity of CDM in the development f the project activity, it has being carried out a sensitivity analysis for the alternative 1 (CDM project activity without the revenue from the sale of CERs) and the project activity with CDM income:

Variation of IRR due to income variation

Variation as a percentage (%) of income	IRR A1 with project	IRR Project with CDM income
10.00%	11.2%	12.6%
5.00%	9.4%	10.8%
3.00%	8.7%	10.1%
1.00%	7.9%	9.3%
0,00% (Original value)	**7.5%**	**8.9%**
-1.00%	7.2%	8.5%
-3.00%	6.4%	7.7%
-5.00%	5.5%	6.9%
-10.00%	3.3%	4.6%

Variation of IRR due to variation of cost

Variation as a percentage(%) of Cost	IRR A1 with project	IRR Project with CDM income
10.00%	3.4%	4.6%

5.00%	5.5%	6.7%
3.00%	6.3%	7.6%
1.00%	7.1%	8.5%
0,00% (Original value)	**7.5%**	**8.9%**
-1.00%	8.0%	9.4%
-3.00%	8.8%	10.3%
-5.00%	9.7%	11.2%
-10.00%	11.9%	13.5%

A sensitivity analysis has been also performed for the parameter Electricity Demand in order to evaluate its effects in the IRR of the project activity alternative. Alternative 1 shows that is needed an increase of 86% in the electricity demand for the project to make it economically attractive (without CDM incomes). The presence of CDM incomes reduces this value in 31% (variation of 55%). Even when a variation of 55% in the electricity demand was not considered very likely to happen, was enormously better than expect an 86% increase to make the project economically feasible. At this point the CDM incomes help to reduce significantly the risk associated with the implementation of the project activity.

Variation of IRR due to variation of electricity demand

Variation as a percentage (%) of Cost	IRR A1 with project	IRR Project with CDM income
86.0%	12.0%	13.5%
70.0%	11.3%	12.8%
55.0%	10.6%	12.1%
30.0%	9.3%	10.7%
15.0%	8.5%	9.9%
5.0%	7.9%	9.2%
(Original value)	7.5%	8.9%

It can be seen that only with CDM incomes the project activity could eventually become an attractive electricity project (with an IRR more than 12%). Since is more probable than the costs raises over the time, the CDM incomes helps ELSE to develop the project activity.

Else also considered the benefits for the people (reduction of costs and increase of the hours of electricity per day) to continue with the implementation of the project activity, but without the CDM income the financial costs would have being too high for a private operation, where you seek economical profitability for the company's sustainability.

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): >>

CDM Consideration

For the present project activity, the feasibility approval form the Economic and Financial Ministry is considered the start date of the project activity in order to be conservative, since the Final Study (investment phase) started soon after this approval. The approval of the project was on March 31st, 2006. The CDM factor was considered at the moment of evaluation of the project activity, before the start date since at the moment of developing the feasibility study, CERs were taken into account (the feasibility study was the document presented and evaluated in orden to obtain the ministry approval). There was also a CDM study of the interconnection project activity before the start date with the title: "Estudio sobre bonos de carbono para la Línea de Transmisión San Gabán Puerto Maldonado" (Study on carbon bonds for Transmission Line St. Gabán Puerto Maldonado). The final version was presented on January 2006.

Additionality

To demonstrate additionality the project has used the "*Tool for demonstration and assessment of additionality – Version 4*":

Step 1.- **Identification of alternatives to the project activity consistent with current laws and regulations**

Step 2- Investment analysis.

Sub-step 2a.- Appropriate analysis method

Section B4 provides the reasons why Option II has been selected as the best option. Investment comparison analysis was selected as the most suitable option considering the available data and its quality.

Sub-step 2b.- Investment comparison analysis

Identification of the financial indicators

Given the features of the project, the most suitable financial indicators is the Net Present Value since data on investments and incomes from electricity sales is available.

Sub-step 2c.- Calculation and comparison of financial indicators

As shown in B.4. financial indicators for each alternative and for the CDM project activity (with the revenue from the sale of CERs) have been estimated. Results indicate alternative 2 as the most economically attractive option. On the contrary, alternative 1 (project activity scenario) was assessed as the less feasible option. In the next table, both proposed alternatives are compared:

Comparison of both alternatives (the most and less feasible)

Alternative	Net Present Value (US $)(Rate=12%)
Less attractive: Alternative 1. Grid connection of isolated electricity systems within the complementary transmission system not undertaken as a CDM project. (CDM project activity without the revenue from the sale of CERs).	-4,451
Most attractive: Alternative 2. Expansion of the actual installed capacity using Diesel as fuel.	-3,274

When considering alternative 1, clearly it does not represent an attractive option from an economic point of view because is an investment and risk not compensated by the estimated incomes nor more attractive than alternative 2. Unless it is supported by direct public investment [(11)] (which as has been pointed out is not the case), the alternative remains unattractive (compared to the Base Line situation).

Relevant assumptions

All assumptions and input data for appraisal of alternatives have been obtained from Else's market researches and previous investments. Likewise, using official information from the Energy and Mining Ministry (MINEM) and that from the Tariff's regulator office ("Gerencia Adjunta de Regulación Tarifaria: GART – OSINERG").

Differences between assumptions.

Differences in cash flows among alternatives are explained by differences in investment's layouts, operation and maintenance costs for each alternative.

Comparison of the financial indicators

It has been clearly describe how the alternative 1 is the less economically attractive option.

Sub-step 2d.- Sensibility analysis

Sensibility analysis has been carried out taking into account variations in electricity incomes and investment costs in order to obtain net present values for each alternative (1 and 2). In the light of this analysis, alternative 1 is within the scope of alternatives confirmed to be the less economically attractive.

Step 4.- Common Practice Analysis

[(11)] Expressed as an important support mechanisms in order to cover all project related investments.

National Interconnection System (SEIN) is evaluated on an annual basis. The aim of the assessments is to determine the current status of the system and to establish and perform expansion plans either by constructing new facilities or by adding new major isolated systems. Periodic evaluations are carried out by COES - SINAC in coordination with OSINERG and the Ministry for Energy and Mining and can be found in documents such as the Electricity Reference Plan and the Transmission Plan.

Therefore, considering the **fore mentioned objective** regarding satisfying energy needs/demand in SEIN while maintaining or improving quality, THE COMMON PRACTICE is to add new major isolated systems in order to increase energy supply offer. Isolated systems though, **do not contribute** to energy supply offer increase.

With the project activity the power plants of the isolated system will not operate anymore and the project activity area will have energy supplied by the grid, so the project activity do not represent the common practice of the country.

Sub-step 4a.- **Analyze other activities similar to the proposed project activity:**

Table below shows those projects included in the Transmission Plan 2007-2008 which are similar to the proposed project activity. The projects belong to both systems: the guaranteed and the complementary transmission system.

Projects included in the Transitory Transmission Plan 2007 – 2008

Name of the project	Estimated entrance date
Guaranteed transmission system	
Transmission Line Chilca-Planicie-Zapallal 220 kV ó 500 kV	2008
Line 220 kV Machupicchu – Cotaruse	2009
Complementary transmission system	
Line Huayucachi - Huancayo eastern – Industrial Park 60 kV and SE Huancayo Eastern 60/22,9/10 kV, 25 MVA	2007
T. L. Carhuaquero -Jaén 140 km, 138 kV, y Substations Jaén 138/60 kV and Carhuaquero 220/138/22,9 kV	2007
T.L Azángaro - Putina -Ananea - Huancané 60 kV Substations Azángaro 138/60/22,9 kV, Ananea 60/22,9/10 kV and Huancané 60/22,9/10 kV	2007
T.L Tocache – Bellavista	2007
T.L. Anta mina - Huari, 60 kV and Huari substation 60/22,9/10 kV	2007
T.L. Cajamarca-Cerro Corona, 33 km, 220 kV and Cerro Corona substation	2008

As it can be seen, government's priorities tend to be focused on those projects with higher transmission capacity (refer to guaranteed transmission projects), while projects with lower capacity are intended to be developed by private agents since such projects are not classified as a national priority and most of them are not financially feasible.

Sub-step 4b.- Discuss any similar options that are occurring:

Major isolated systems identified in the Electricity reference Plan 2005 – 2014 are:

- Isolated system: Iquitos

  The electric system is located in the region denominated Loreto. (Department of Loreto – See graph 4.1) It supplies electricity to Iquitos city. This is one of the biggest and oldest isolated systems in Peru. Installed capacity is 46, 7 MW, mainly with medium speed diesel generators using residual oil. The company Electro Oriente S.A. has the concession for this system.

- Isolated system Tarapoto – Moyabamba – Bellavista

  The system comprises three main load centers located in San Martin region (Department of San Martin). The centers are connected by a transmission line of 138 kV and some other loads or individual generation plants connected to a 60kV system. The system is operated by Electro Oriente S.A.

- Isolated system Bagua – Jaén

  This system includes 2 main load centers connected by transmission lines of 60 kV and some other loads or individual generation plants connected by lines of 22, 9 kV. These centers are located in Cajamarca and Amazonas regions. Electro Oriente S.A. is in charge of operation reporting to ADINELSA.

  The Jaen – Bagua isolated system will be interconnected to the SEIN, but this will occur under different conditions compared to the proposed project activity. This interconnection will have a considerably shorter transmission line (140 km versus 225 km form the project activity) which result in lower real investments (14,7 MM USD versus 20,16 MM USD[12]). The demand in Jaen – Bagua isolated system is higher than the project activity (45 GWh in 2007 versus 26.57 GWh). All of this condition makes this interconnection by far, more feasible than the project activity.

- Isolated system Puerto Maldonado (project activity)

  The electricity reference plan states that generation plants within Puerto Maldonado isolated systems will be out of service in 2008 and SEIN will supply electricity in the region. [(13)]. This is to say that this connection as being part of the Complementary transmission plan does not affect electricity supply offer or its quality.

Current Scenario

[12] This are the r eference Plan 2006 - 2015.

[(13)] Chart 35 – C 2014

Information from steps 4a y 4b, provide sufficient evidence to conclude that project activity is **not a common practice** and thus the **project is additional**.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The emission reduction calculation is based on the approved methodology: AM0045 - version 1.1: "Grid connection of isolated electricity systems".

The emission factor from the national grid was estimated using the methodology ACM0002 "*Consolidated methodology for grid-connected electricity generation from renewable sources - Version 6*",

Baseline Emissions

Baseline emissions (BE_y in tonne CO_2) are the product of the baseline emission factor ($EF_{bl,yp}$ in tonne CO_2/MWh) and electricity supplied to the isolated area by the grid in the project activity (EG_y in MWh).

$$BE_y = EG_y \cdot EF_{bl,yp}$$

Where:

EG_y = is electricity supplied to the isolated area by the grid in the year y_p (MWh).

The following formula is used to estimate the baseline emission factor:

$$EF_{bl,ini} = \frac{\sum_{i,j} F_{i,j,bl} \times COEF_{i,j}}{\sum_{j} GEN_{j,bl}}$$

Where:

$EF_{bl,ini}$ = is the baseline emission factor of the isolated system (tonne CO_2e/MWh) at the time of the interconnection to the grid.

$\Sigma F_{i,j,bl}$ = is the amount of fuel i (gal) consumed by relevant power sources j in the most recent three years.

$COEF_{ij}$ = is the CO_2 coefficient of fuel i (tonne CO_2/gal), taking into account the carbon emission factor of the fuels (tonne CO_2/TJ) used by relevant power sources j, net calorific value of the fuel (TJ/mass of volume unit) and the percent oxidation of the fuel i.

$GEN_{,j,bl}$ = is the electricity (MWh) delivered to the isolated system by source j in the most recent three years prior to the implementation of the proposed CDM project activity

The life time and power production of each power plant may influence the emission factor. The influence is determined using the following formula:

$$LT_{avg} = \frac{\sum (S_{ini} \cdot LT_{i,ini})}{\sum S_{ini}}$$

Where:

LT_{avg} = Is the average remaining lifetime of the equipments used in the isolated system at the time of the interconnection, weighted with the supply capacity of the equipments at the beginning of the project activity.

$LT_{i,\ ini}$ = is the life time of equipment 'i' (in years) used in the isolated grid, estimated at the time of isolated system being connected to the grid.

$S_{\ ini}$ = is the equipments power supply capacity in the isolated system (in MW) at the time of the interconnection to the grid

S_{yp}, is calculated comparing y_p and LT_{avg},:

$$S_{yp} = S_{ini} - S_{ini} \cdot \frac{yp}{\left(2 \times LT_{avg}\right)}$$

if: $yp < 2*LT_{avg}$

or:

$$S_{yp} = 0 \qquad \text{if} \quad yp \geq 2LT_{avg}$$

Where:

y_p = is the number of years since the isolated system was interconnected to the grid (project year)

S_{yp} = is the power that would be supplied in the baseline scenario to previously isolated system in project year y_p (MW) if the equipments in the system were not replaced at the end of their lifetime

S_{yp} is contrasted with the demand D_{yp}, and the final baseline emission factor is calculated with the following formula:

$EF_{bl,yp} = EF_{bl,ini}$ if: $S_{yp}>0$ *and* $S_{yp}>D_{yp}$

$$EF_{BL,yp} = \frac{EF_{BL,ini} \times S_{yp} + EF_{BAT} \times (D_{yp} - S_{yp})}{D_{yp}} \qquad \text{if: } S_{yp}>0 \text{ and } S_{yp}< D_{yp}$$

$EF_{bl,yp} = EF_{BAT}$ if: $S_{yp}=0$

Where:

$EF_{bl,yp}$ = is the baseline emission factor (in tonne CO_2e/MWh) of the project (previously isolated system at year y_p).

$D_{,yp}$ = is the power electricity demand in MW of the project (previously isolated system at year y_p).

EF_{BAT} = is the baseline emission factor (in tonne CO_2e/MWh) for the best available kind of technology in the isolated system; with the lowest CO_2 emission factor at the beginning of the Project activity.

Project Emissions

To estimate the emissions from the project activities is use the following equations:

$$PE_{y} = (EG_y \cdot EF_p) \cdot (TL + 1) + PE_{SF6,y}$$

Where:

PE_y = Project activity emissions (tonne CO_2e)

EG_y = Is electricity supplied to the isolated area by the grid in the year y_p (MWh)

EF_p = CO_2 emission factor of the grid. (tonne CO_2 / MWh)

TL = Is an incremental transmission loss ($1.0 \geq TL \geq 0.0$) of the project activity over and above those in the isolated area.

$PE_{SF6,\,y}$ = Emissions related to SF_6 used in the new equipments of the project activity during the year y (tonne CO_2e)

Emission factor of the grid

The emission factor of the project is calculated ex ante using the following formula:

$$EF_{p,y} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

Where:

EF_p = CO_2 emission factor of the grid. (tonne CO_2 / MWh)

$EF_{OM,y}$ = CO_2 Operating Margin Emission Factor of the Grid (tonne CO_2e/MWh)

$EF_{BM,y}$ = CO_2 Build Margin Emission Factor of the Grid (tonne CO_2e/MWh)

w_{OM} = Weighting of Operating Margin Emission Factor

w_{BM} = Weighting of Build Margin Emission Factor

The default weight factors are $w_{BM} = w_{OM} = 0.5$

The Operating Margin Emission Factor is calculated ex ante using the Simple Adjusted Operating Margin Emission Factor since the national grid is more than 50% low cost/must run generation and data for the proper application of the dispatch option is not available:

Low cost/must run generation in the national grid

Year	Low cost/must run generation	%	No low cost/must run generation	%
2004	16,692,999	76.2	5,210,091	23.8
2005	17,100,838	74.4	5,891,974	25.6
2006	18,670,710	72.3	6,092,070	27.7

The formula use is:

$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y).\frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_{j} GEN_{j,y}} + \frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_{k} GEN_{k,y}}$$

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

Where:

$F_{i,j,y}$ = is the amount of fuel *i* (in a mass or volume unit) consumed by power sources *j* in year(s) *y*,

$F_{i,k,y}$ = is the amount of fuel *i* (in a mass or volume unit) consumed by power sources k in year(s) *y*,

j = refers to the power sources delivering electricity to the grid that are not low-operating cost and must run power plants

k = refers to the power sources delivering electricity to the grid, that are low-operating cost and must run power plants

$COEF_{i,j\,y}$ = is the CO_2 emission coefficient of fuel *i* (tonne CO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year(s) *y*,

$COEF_{i,k\,y}$ = is the CO_2 emission coefficient of fuel *i* (tonne CO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources k and the percent oxidation of the fuel in year(s) *y*,

$GEN_{j,y}$ = is the electricity (MWh) delivered to the grid by source *j*.

$GEN_{k,y}$ = is the electricity (MWh) delivered to the grid by source k.

λ_y = is determined using methodology ACM0002

The build margin emission factor is calculated ex ante as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y}.COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

Where:

$EF_{BM,y}$ = Build margin CO_2 emission factor in year y (tonne CO_2/MWh)

$F_{i,m,y}$ = is the amount of fuel *i* (in a mass or volume unit) consumed by power sources *m* in year(s) *y*,

$COEF_{i,m\,y}$ = is the CO_2 emission coefficient of fuel *i* (tonne CO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *m* and the percent oxidation of the fuel in year(s) *y*,

$GEN_{m,y}$ = is the electricity (MWh) delivered to the grid by source *m*.

The Build Margin emission factor *EFBM,y* is calculated *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Emissions related to SF_6

The new equipment could be a source of SF_6 emissions: The emission would be calculated using the following

$$PE_{SF6,\,y} = M_{SF6,\,y} \cdot GWP_{SF6}$$

Where:

$M_{SF6,\,y}$ = Is the average quantity of SF_6 leaks in the equipments during year y in tonnes of SF_6. The value will be determined using the amount of SF_6 injected in the equipments during maintenance to maintain their operation standards.

GWP_{SF6} = Is the global warming potential of sulphur hexafluoride (23,900 is the value for first commitment period).

Leakage

The leakage will be calculated using the following formula:

$$LE_1 = A_{def} \cdot L_C$$

Where:

LE_1 = Leakage emissions to be accounted in the first year of project crediting period (tonne CO_2e)

A_{def} = Is the area of land deforested in hectares.

L_C = Is the carbon stock per unit area (above ground, below ground, soil carbon, litter

and dead biomass), in tonnes of CO_2 per hectare

Emission reductions

The emission reductions are calculated using the following formula:

$$ER_y = BE_y - PE_y - LE_1$$

Where:

BEy = Baseline emissions during year y(tonne CO_2e)

PE_y = Project activity emissions during year y (tonne CO_2e)

LE_1 = Leakage emissions to be accounted in the first year of project crediting period (tonne CO_2e)

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

Data / Parameter:	$COEF_{i,j}$
Data unit:	tonne CO_2/tonne
Description:	CO_2 emissions coefficient of each fuel type i consumed by the power plants j of the isolated system in the baseline scenario. This is estimated as product of carbon content of the fossil fuel per unit energy NCV and oxidation factor.
Source of data used:	IPCC
Value applied:	3.19
Justification of the choice of data or description of measured methods and procedures actually applied:	There are not publicly available official data, plant or country-specific values. Then IPCC default values are use to calculate the CO_2 emissions coefficient for isolated system in the baseline scenario.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$GEN_{j,bl}(PM)$
Data unit:	MWh.
Description:	Electricity supplied to the isolated system in the baseline scenario by power generation sources "j" during the last there years before the beginning of the project activity.
Source of data used:	Historic records based on electricity meters recording.
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and	There are historic records based on real measurements for every generation source in Puerto Maldonado (PM) at validation.

procedures actually applied:	
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$F_{i,j,bl}$ **(PM)**
Data unit:	gl
Description:	Amount of fossil fuel consumed by each power plant of the isolated system in the baseline scenario during the last three years before the beginning of the project activity.
Source of data used:	Historic records from the isolated system, responsibles of the generation units or an official entity.
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	There is reliable data from historic records based on real measurements for every generation source in Puerto Maldonado at validation.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$LT_{aveg,}$ **(PM)**
Data unit:	years
Description:	$LT_{aveg,}$ is the average remaining lifetime of the equipments estimated using formulae 4 defined in the baseline emissions section above.
Source of data used:	Records of operation of the generation units.
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	Estimation made using records and the historic of similar equipments in Puerto Maldonado and the experience of the project activity (used to develop the previous studies, as the feasibility study).
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	EF_{BAT} **(PM)**
Data unit:	tonne CO_{2e}/MWh
Description:	Is the baseline emissions factor for the most efficient kind of technology displaced in the isolated system.
Source of data used:	Historic records from the isolated system, responsibles of the generation units or an official entity.
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of	Is data from the most efficient kind of technology displaced in Puerto Maldonado.

measured methods and procedures actually applied:	
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$EF_{bl,ini}$ **(PM)**
Data unit:	tonne CO_{2e}/MWh
Description:	Is the baseline emissions factor of the isolated electricity system at the time of the interconnection to the grid.
Source of data used:	Historic records from the isolated system and IPCC values.
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	Calculation made with reliable data from historic records based on real measurements for every generation source in Puerto Maldonado.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	A_{def}
Data unit:	hectares
Description:	Area of land deforested in the construction of the interconnection lines.
Source of data used:	Based on project technical information and the Electricity Supply National Code 2001
Value applied:	0.4518
Justification of the choice of data or description of measured methods and procedures actually applied:	The value calculated is bases on the multiplication of the length of the transmission line and the width of the right of way contemplated by law.
Any comment:	The value is conservative because not all the length of the transmission line crosses over forest areas. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	L_c
Data unit:	tonne CO_2/hectare
Description:	Carbon stock per area(above ground, below ground, soil carbon, litter and dead biomass)
Source of data used:	Study: "Servicios ambientales de almacenamiento de carbono como activo para el desarrollo en la amazonía peruana: avances y retos" which is "Environmental services from carbon storage as an assets for development in the Peruvian Amazon: Progress and Challenges".

Value applied:	405.36
Justification of the choice of data or description of measured methods and procedures actually applied:	Is primary data for Peruvian forest (even when the study is not developed in Puerto Maldonado).
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$F_{i,j,y}$
Data unit:	Coal = tonne Diesel = gal Natural Gas = kft^3
Description:	is the amount of fuel consumed by power sources *j* in year(s) *y*,
Source of data to be used:	The fuel consumption per power plant will be obtained from the COES - SINAC
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	The information obtained from the COES - SINAC is official.
Any comment:	Is statistical data. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$F_{i,k,y}$
Data unit:	Coal = tonne Diesel = gal Natural Gas = kft^3
Description:	is the amount of fuel *i* consumed by power sources k in year(s) *y*,
Source of data to be used:	The fuel consumption per power plant will be obtained from the COES - SINAC
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	The information obtained from the COES - SINAC is official.
Any comment:	Is statistical data. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	*COEFi*

Data unit:	tonne CO_2 /tonne Coal = tonne CO_2tonne Diesel = tonne CO_2 /gal Natural Gas = tonne CO_2 / kft^3
Description:	is the CO_2 emission coefficient of fuel, taking into account the carbon content of the fuels used by relevant power sources *j or k* and the percent oxidation of the fuel in year(s) *y*,
Source of data to be used:	IPCC
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	There are no local values. Then, IPCC default values are use.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$GEN_{i',j',k,y}$
Data unit:	MWh
Description:	Electricity generation of each power plant.
Source of data used:	The electricity generation per power plant will be obtained from the COES - SINAC
Value applied:	Data used in the calculations are presented in the spreadsheets attached with the PDD.
Justification of the choice of data or description of measured methods and procedures actually applied:	The information obtained from the COES - SINAC is official.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	**Power plant name**
Data unit:	Text
Description:	Name of each one of the power plants included in the boundaries of the project activity
Source of data to be used:	A list of the power plants connected to the grid is on the web site of COES – SINAC.
Value applied:	-
Justification of the choice of data or description of measured methods and procedures actually	The information obtained from the COES - SINAC is official.

applied:	
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$EF_{OM,y}$
Data unit:	tonne CO_2e/MWh
Description:	National Grid Operating Margin emission factor
Source of data to be used:	The Data is obtained from the Committee of Economic Operation of the National Interconnected Electric System. (COES - SINAC). The COES - SINAC provides information of electricity generation and fuel consumption for each power plant connected to the SEIN system
Value applied:	0.6855
Justification of the choice of data or description of measured methods and procedures actually applied:	The Operating margin is calculated ex ante using the Simple Adjusted Operating Margin option. The information obtained from the COES - SINAC is official. In put data can be cross checked with official information from the COES.
Any comment:	Calculations were made using ACM0002 as suggested in methodology AM0045 version 1.1 Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$EF_{BM,y}$
Data unit:	tonne CO_2e/MWh
Description:	National grid build Margin Emission Factor
Source of data to be used:	The Data is obtained from the Committee of Economic Operation of the National Interconnected Electric System. (COES - SINAC). The COES - SINAC provides information of electricity generation and fuel consumption for each power plant connected to the SEIN system
Value applied:	0.2879
Justification of the choice of data or description of measured methods and procedures actually applied:	The build margin is calculated ex ante as the generation-weighted average emission factor the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently at the moment of presentation of the PDD. The information obtained from the COES - SINAC is official. In put data can be cross checked with official information from the COES.
Any comment:	Calculations were made using ACM0002 as suggested in methodology AM0045 - version 1.1 Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	EF_p
Data unit:	tonne CO_2e/MWh
Description:	National Grid Emission Factor
Source of data to be used:	The Data is obtained from the Committee of Economic Operation of the National Interconnected Electric System (COES - SINAC). The COES - SINAC provides information of electricity generation and fuel consumption for each power plant connected to the SEIN system

Value applied:	0.4867
Justification of the choice of data or description of measured methods and procedures actually applied:	The National Grid emission factor is the result of a weighted average of the Operating Margin and the Build Margin. The weight values were 0.5 for both OM and BM The information obtained from the COES - SINAC is official. In put data can be cross checked with official information from the COES.
Any comment:	Calculations were made using ACM0002 as suggested in methodology AM0045 - version 1.1 Data will be archived for a period of two years from the end of the crediting period.

B.6.3 Ex-ante calculation of emission reductions:

The emission reduction calculation is based on the approved methodology: AM0045 - version 1.1: "Grid connection of isolated electricity systems".

The emission factor from the national grid was estimated using the methodology ACM0002 "*Consolidated methodology for grid-connected electricity generation from renewable sources - Version 6*",

More baseline information is presented in Annex 3.

Else has developed an interconnection project activity for isolated power generators in Puerto Maldonado (ELSE's property), Mazuco (very small town in the middle of the forest) and Mines (96 small mines). Since Mazuco and Mines will be connected to the transmission line independently of each other and of ELSE, their real contribution to emission reductions attributable to the project activity will be taken into account in the future and pertinent verification process after the interconnection (calculation use data at the moment of interconnection, as stated in the ACM0045, v1). The generation units considered in the project activity are only the ones with complete data for generation and/or fuel consumption.

Demand and fuel consumption projections are presented in the attach documnentation (ER spreadsheet[14]), but their contribution is not considered at the moment of calculation the ER in this PDD in order to be conservative in the estimations and consider only units with complete data. The generation and fuel consumption considered at this moment are the ones that belongs to ELSE (Puerto Maldonado) which has complete and validated records of generation and fuel consumption for the past 3 years at the moment of validation. Taking into account that the project expects to be implemented by October 2008 the data used is correct, but in case the interconnection is done in 2009 data for Puerto Maldonado will be updated.

Baseline Emissions

[14] Data has been checked at validation.

The results of the applications of the following formula during the first crediting period are presented in the next table

$$BE_y = EG_y \cdot EF_{bl,yp}$$

Base Line Emissions for the project activity

Year	Total
2008	19,139
2009	19,955
2010	20,800
2011	55,609
2012	57,383
2013	59,198
2014	61,550

$EF_{bl,yp}$ is estimated according to the methodology and EG_y is a projected value.

The results of the applications of the following formula in the most recent three years are presented in the next tables.

$$EF_{bl,ini} = \frac{\sum_{i,j} F_{i,j,bl} \times COEF_{i,j}}{\sum_{j} GEN_{j,bl}}$$

Fuel consumption (gal of Diesel)

Year	Total
2005	4,515,431
2006	4,698,917
2007	5,017,652

Demand (MWh)

Year	Total
2005	50,599
2006	53,289
2007	57,638

The life time of power plants was determined using the following formula, considering estimations made using the historic of similar equipments and the experience of the project activity (used to develop previous studies like the feasibility study).

:

$$LT_{avg} = \frac{\sum (S_{ini} \cdot LT_{i,ini})}{\sum S_{ini}}$$

Average lifetime of unit generations (years)

Year	Total
LT_{avg}	5.8

The results for S_{yp}, are:

S_{yp},(MW)

Year	Total
2008	11.4
2009	10.6
2010	9.9
2011	12.1
2012	10.7
2013	9.3
2014	7.9

The results for $EF_{bl,yp}$ are:

$EF_{bl,yp}$ (tonne CO_2e/MWh)

Year	Total
2008	0.8
2009	0.8
2010	0.8
2011	0.9
2012	0.9
2013	0.9

2014	0.9

Project Emissions

The results of the applications of the following formula during the first crediting period are presented in the next table.

$$PE_{y} = (EG_{y} \cdot EF_{p}) \cdot (TL + 1) + PE_{SF6,y}$$

Project Emissions (tonne CO_2e)

Year	Total
2008	12,707
2009	13,241
2010	13,795
2011	30,588
2012	31,660
2013	32,756
2014	34,151

Emission factor of the grid

The emission factor of the project is calculated ex ante using the following formula:

$$EF_{p,y} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

$$= 0.5 \cdot 0.6855 + 0.5 \cdot 0.2879 \text{ tonne } CO_2e/MWh$$

$$=0.4867 \text{ tonne } CO_2e/MWh$$

Please refer to Annex 3 to see the complete calculation of the emission factor of the grid.

Emissions related to SF_6

Estimated SF_6 leaks based on manufacturer information are use in the present PDD for ex ante calculation.

SF_6 emissions (tonne CO_2e)

Year	Emissions

2008	161.33
2009	161.33
2010	161.33
2011	161.33
2012	161.33
2013	161.33
2014	161.33

Leakage

Leakage is calculated for the total length of the transmission lines, using the width of the right of way contemplated by law (20 meters). The value is conservative because not all the length of the transmission line crosses over forest areas.

Leakage - Ly (tonne CO_2e)

Transmission Line	Length (km)	Deforested area (Ha) - A def	Lc	Ly,1
San Gabán Mazuco	68	0.0136	1486.32	**20.2**
Mazuco Puerto Maldonado I	26.7	0.00534	1486.32	**7.9**
Mazuco Puerto Maldonado II	125.9	0.02518	1486.32	**37.4**
Mazuco Puerto Maldonado III	5.3	0.00106	1486.32	**1.6**
Total	**225.9**	**0.04518**		**67.2**

Since, the estimated leakage emissions from deforestation are below the 1% of the project's estimated emission reductions over the first crediting period and then the leakage is not accounted.

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

The following table shows the project activity annual emission reductions:

Summary of the Project Emission Reduction

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of base line emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emissions reduction (tonnes of CO_2e)

2008	19,139	12,707	0	6,433
2009	19,955	13,241	0	6,714
2010	20,800	13,795	0	7,005
2011	55,609	30,588	0	25,021
2012	57,383	31,660	0	25,723
2013	59,198	32,756	0	26,442
2014	61,550	34,151	0	27,398
Total (tonnes of CO_2e)	**293,634**	**168,899**	**0**	**124,736**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity dispatched from the grid in the Project scenario
Source of data to be used:	Project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Data used in the calculations and complete projections are presented in the spreadsheets attached with the PDD.
Description of measurement methods and procedures to be applied :	Directly measured data with on-site electricity meter. Data will be measured every 15 minutes and aggregated hourly, monthly and yearly.
QA/QC procedures to be applied:	The operation of the transmission line will be with the SCADA system. The values could be double check by receipt of payments. Official organisms like COES or the MINEM will have statistics that could be cross checked. There will be developed a balance of energy to adjust data. The meters will have an accuracy of 0.2% and will be contrasted (tested with an equipments of reference) once a year. There is no calibration frecuency stablish by law, but the project proponent will calibrate the meter every three (03) years (the contrasting process is very accurate). It is also the possibility that if the constrasting procedure shows an accuracy over 0.2% the meter is change by a new one. The project activity is subject to audits from the OSINERG (Resolution OSINERG N° 005-2004-OS/CD) where in case of not passing the contrast/verification the meter has to be change by a new one. This procedure is done at lest once every 10 years.

Any comment:	In every energy transaction (bought in this case) are made pulse measurements every 15 minutes. With this information is monthly done a balance of energy. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$M_{SF6,y}$
Data unit:	tonne
Description:	SF_6 leaks in the new equipments during year y
Source of data to be used:	ELSE records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00675
Description of measurement methods and procedures actually applied :	Will be measured and recorded the extra amount of SF_6 injected in the equipments to maintain their operation standards every time is required. There will be a constant control of the pressure gauges that monitor the variations of SF_6, in case of leaks (evident when there is a change in the pressure levels above the limits established). Else will record every injection of gas in a year in order to calculate project emissions.
QA/QC procedures to be applied:	Information will be collected through direct measurements while recharging equipments.
Any comment:	Data will be archived for a period of two years from the end of the crediting period. According to the manufacturer the equipments are free maintenance.

Data / Parameter:	**Public policies**
Data unit:	-
Description:	Verification and evaluation of financial and institutional arrangements that could help the implementation of the project.
Source of data to be used:	Electric sector policy documents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures actually applied :	
QA/QC procedures to be applied:	Public policies will be corroborated with official public documents or communications.
Any comment:	Will be monitored at every verification. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	D_{yp} ***(PM, Mazuco or Mines)***

Data unit:	MW
Description:	Power demand in the project activity scenario
Source of data to be used:	Direct measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Data used in the calculations and complete projections are presented in the spreadsheets attached with the PDD.
Description of measurement methods and procedures to be applied :	Directly measured every 15 minutes. Every month these values are used for the monthly invoices. There will be developed a balance of energy to adjust data in PM.
QA/QC procedures to be applied:	Comparison with information generated in the COES and/or invoices. Internal records of the future interconnected units shall cross checked with invoices or other formal documentation.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	**S_{yp} *(PM, Mazuco or Mines)***
Data unit:	MW
Description:	Power supply of the displaced power plants in isolated area in the baseline scenario
Source of data to be used:	Calculate using information of the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Data used in the calculations and complete projections are presented in the spreadsheets attached with the PDD.
Description of measurement methods and procedures actually applied :	Calculated as stated in methodology AM0045 version 1.1 every year (or for a monitoring period).
QA/QC procedures to be applied:	-
Any comment:	Based in the remaining lifetime of the equipment. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	**Yp *(PM, Mazuco or Mines)***
Data unit:	Year
Description:	Number of years since the isolated area is connected to the grid. The project may include different isolated areas being connected to the grid at different years within the crediting period.
Source of data to be used:	Records
Value of data applied for the purpose of	Record the time and date since the systems are connected

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures actually applied :	Will be recorded the date when each isolated system included in the project boundary is connected to the grid. Then, yp will be determined counting the number of years from the date of connection to the year y in the crediting period.
QA/QC procedures to be applied:	Cross checked with official information (COES – SINAC, OSINERG, MINEM)
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	***TL***
Data unit:	%
Description:	Additional transmissions losses.
Source of data to be used:	Project activity records.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	3.6
Description of measurement methods and procedures actually applied :	Will be measured through the balance of energy and a power flow, which calculates the technical looses independent from the ones from theft or others. The power flow is an iterative mathematical model with accuracy lower than 0.1%. The balance of energy is done monthly and the model, once a year.
QA/QC procedures to be applied:	Cross checked with official information (COES – SINAC, OSINERG, MINEM).
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	***S_{ini} (PM, Mazuco or Mines)***
Data unit:	MW
Description:	Equipments power supply capacity in the isolated system at the time of the interconnection to the grid.
Source of data used:	Records from the isolated system, responsibles of the generation units or an official entity.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Data used in the calculations are presented in the spreadsheets attached with the PDD (estimations).
Description of measurement methods and procedures actually applied :	At the moment of interconnection, the power supply capacity for the equiptment will be monitored.
QA/QC procedures to be applied:	Maintenance reports, manufacturer information or equivalent. The visit of an electrical engineer (or similar) can be use to corroborate the information of the equipments (presenting a report with photos showing the physical

	characteristics of the unit).
Any comment:	Data is only adquired at the moment of interconnection. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	***LT $_{i,ini}$ (PM, Mazuco or Mines)***
Data unit:	years
Description:	Lifetime of equipment "i" at the time is replaced by the grid.
Source of data used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Data used in the calculations are presented in the spreadsheets attached with the PDD (estimations made using the historic of similar equipments and the experience of the project activity, used to develop the previous studies, as the feasibility study).
Description of measurement methods and procedures actually applied :	At the moment of interconnection, the remaining lifetime of equipments will be monitored.
QA/QC procedures to be applied:	Maintenance reports, manufacturer information or equivalent. When manufacturer information of the lifetime of the unit is lower than the one expected by the owner, this information will be used in the CDM calculations. The start date of operation of the units shall be corroborated with invoices of purchase or other internal reports/documentation//invoices that corroborate the date.
Any comment:	Data is only adquired at the moment of interconnection. Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	***GEN $_{j,bl}$ (Mazuco or Mines)***
Data unit:	MWh.
Description:	Electricity supplied to the isolated system in the baseline scenario by power generation source "j" during the last there years before the beginning of the project activity.
Source of data used:	Historic records.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Projections are presented in the spreadsheet attached with the PDD.
Description of measurement methods and procedures actually applied :	Statistical data
QA/QC procedures to be applied:	Directly measured or publicly available official data or accepted estimations. Default data and literature statistics are used to check the local data. When major variations are found, the project proponent shall explain them or use the lower value.

	When units report to official entities as COES, data shall be corroborated with it's annual statistics.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$F_{i,j,bl}$ ***(Mazuco or Mines)***
Data unit:	gl
Description:	Amount of fossil fuel consumed by each power plant of the isolated system in the baseline scenario during the last three years before the beginning of the project activity.
Source of data used:	Historic records.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Projections are presented in the spreadsheet attached with the PDD.
Description of measurement methods and procedures actually applied :	Statistical data.
QA/QC procedures to be applied:	Directly measured, publicly available official data or accepted estimations. Default data and literature statistics/efficiency are used to check the local data. When major variations are found, the project proponent shall explain them or use the lower value. When units report to official entities as COES, data shall be corroborated with it's annual statistics.
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$LT_{aveg,}$ ***(Mazuco or Mines)***
Data unit:	years
Description:	$LT_{aveg,}$ is the average remaining lifetime of the equipments estimated using formulae 4 defined in the baseline emissions section above.
Source of data used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Projections are presented in the spreadsheet attached with the PDD.
Description of measurement methods and procedures actually applied :	-
QA/QC procedures to be applied:	-
Any comment:	Data will be archived for a period of two years from the end of the crediting period. Estimations can be made using the historic of similar equipments and the experience of the project activity (used to develop the previous studies, as the feasibility study).

Data / Parameter:	EF_{BAT} *(Mazuco or Mines)*
Data unit:	tonne CO_{2e}/MWh
Description:	Is the baseline emissions factor for the most efficient kind of technology displaced in the isolated system.
Source of data used:	Project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Projections are presented in the spreadsheet attached with the PDD.
Description of measurement methods and procedures actually applied :	Measurements or estimations and calculation of the unit efficiency. Directly measured or publicly available official data or aceptable estimations. Manufacturer information can be used if this is more conservative.
QA/QC procedures to be applied:	-
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

Data / Parameter:	$EF_{bl,ini}$ *(Mazuco or Mines)*
Data unit:	tonne CO_{2e}/MWh
Description:	Is the baseline emissions factor of the isolated electricity system at the time of the interconnection to the grid.
Source of data used:	Project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Projections are presented in the spreadsheet attached with the PDD.
Description of measurement methods and procedures actually applied :	Calculated
QA/QC procedures to be applied:	-
Any comment:	Data will be archived for a period of two years from the end of the crediting period.

B.7.2 Description of the monitoring plan:

The project developer will arrange a proper structure to carry out an adequate monitoring o the project activity.

Before the start of the crediting period of the project activity, the following procedures will be implemented / adapted:

- Establish and maintain data measurement, collection and recording systems and procedures.
- Procedure for quality assurance for internal and external data acquisition.

- Procedure for project performance review before submitted for verification.
- Management and operations system.
- Procedures for storing and maintain records (paper trail).
- Identification of training needs to enable operational staff to meet the needs of the project and this monitoring plan.
- Procedures for maintenance of equipment.
- Procedure for corrective actions to improve future monitoring and reporting.
- Emergency Response Procedures.

The Monitoring and Verification Plan describes the procedures for data collection, and auditing required for the project, in order to determine and verify emissions reductions achieved by the project. This project will require only very straightforward collection of data, described in this PDD, most of which will be collected routinely by ELSE.

All necessary operational and management structures necessary to monitor emissions reductions and any leakage effects generated by the project activity will be common practice in the operation of ELSE.

Calibration and verification of the measurement equipments, and the necessity to connect to equipments of reference will be contemplated in the procedures above, and is stated in the description of the variable it monitors (in the present PDD).

All data will be electronically archived at least during the whole crediting lifetime of the project plus two years after that.

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 of the application of the methodology to the project activity study:

10/04/2008

Company : DEUMAN SAC
Address : Jose Pardo Av. 231, Of. 502 Miraflores (Lima18)
Country : Peru
Telefax : +51(1)2424527
e-mail : info@deuman.com

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:

The start date of the CDM project activity is March 31st, 2006. The project activity expects to start operations on 01/09/2008 aproximately.

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

The Project life time is around 30 year.

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:

The estimated date for the beginning of the first crediting period is September, 1st 2008 but the project plans to start its Monitoring and Crediting period only as soon as it is officially registered as a CDM activity.

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

According to the Environmental impact assessment approved by Resolution Nº 106-2007-MEM/AAE 29 of January/2007, identified environmental impacts are as follows:

Environmental impacts	Mitigation actions
Activities in different stages of the project activity will have impact on: • Landscape quality/amenity • Population health	During construction phase working areas will be properly delimited and signalized in order to install the posts. Painting the transmission poles with ... camouflage effect paintings shall be done in order to integrate them with the surrounding landscape.
During construction phase noise could be generated as well as particulate matter. Both impacts will disturb population and local fauna given the rather short distance between the project construction areas and the habitats.	The project should be limited to the established area managing to avoid any disturbance on private property and/or wild life (flora and fauna).
Because the project area is close to population centers, construction phase is going to have effects on the surrounding landscape. This is to say increase of construction personnel, construction equipments, vehicles, residual soil from excavations, etc.	Construction managers shall take appropriate measures to avoid or minimize any landscape alteration in the area. Spots where machines, vehicles and residual soil are to be located should be clearly identified with the aim to reduce landscape impacts.
The construction of temporary access roads is necessary. Thus, vegetal cover formerly used for cattle feeding will be affected. In addition, noise derived from the project activities would disturb native fauna in the region.	Appropriate measures will be taken: Access roads for construction will be adequately limited aiming to avoid cattle passing through restrained areas.
Construction activities might affect vehicles normal transit or limit nearby population's displacement options.	Contractor shall establish planned coordination actions in order to prevent construction activities having any major disturbance on normal transit patterns of vehicles.
Activities such as digging and installment of posts and electric lines could affect farming activities being developed along the transmission line.	When possible, construction activities will avoid impacts on areas where economic activities take place, in particular those related to farming activities. Before project implementation, both private and public terrains use will be legalized.
External social conflicts affect projects normal activities.	Public disclosure about the project will be the main preventive measure to avoid any possible conflict or problem with other projects taking

	place in the area.

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:

Project participants do not consider environmental impacts of significance.

SECTION E. Stakeholders' comments

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

ELECTRO SURESTE S.A.A. (ELSE) carried out two informative workshops: *"Transmission line San Gabán - Puerto Maldonado, benefits for climate change*" in Puerto Maldonado and Mazuko, addressing main stakeholders in the region.

ELSE invited stakeholders (institutions, organizations and public in general – citizens from Puerto Maldonado and Mazuko) through letters, press notes and public information in massive media: radio and television.

Mazuko Workshop:

It took place in a venue belonging to the church in Mazuko district. Sixty people attended the workshop among them: local authorities, local leaders and general public.

The agenda included a presentation of the project (Interconnection San Gabán – Mazuko – Puerto Maldonado) and its main features and social and economic benefits. Conversely, causes and effects of climate change issues were also appointed to give clarity on how the project helps to mitigate climate change impacts.

Pictures displayed below correspond to the forementioned workshop in Mazuko.

Puerto Maldonado Workshop:

In Puerto Maldonado the workshop took place in the installations belonging to ELSE. Approximately 20 participants attended, among them local authorities and public and private organizations.

Similarly to Mazuko workshop, the agenda included a presentation of the project (Interconnection San Gabán – Mazuko – Puerto Maldonado) and its main features and social and economic benefits. Conversely, causes and effects of climate change issues were also appointed in order to give clarity on how the project helps to mitigate climate change impacts.

During both workshops comments on the interconnection project and climate change impacts were registered and are presented in section E.2.

E.2. Summary of the comments received:

Comments from stakeholders in both workshops regarding the project activity implementation were positive since it brings many social and economic benefits to population in Mazuko and Puerto Maldonado.

In Mazuko for instance, electricity supply is available only for 5 running hours per day (from 6 to 11 pm). The project activity will have a positive impact on Mazuko´s development and its inhabitants. Therefore, the project was widely supported by participants and Else's initiative was highly valued. Comments and questions received were related to starting date of the construction and that of electricity availability in the city.

Puerto Maldonado unlike Mazuko faces a different situation. Electricity supply is available 24 hours per day from a thermal power plant (Else's property). This plant is intended to be shut down and consequently GHG emissions will be reduced. Comments from stakeholders on this project addressed the fact that profits from selling CER´s should be reinvested on social projects in the region.

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

All comments were duly attended. Else's representatives responded to the comments as follows:

- Else's representative fully explained the schedule for commissioning, constructing and operation of the new transmission line San Gabán – Mazuko – Puerto Maldonado. The commitment from ELSE is to inform stakeholders through local authorities about the progress on project development.

- Else's director in Puerto Maldonado pointed out that any income from CER´s commercialization has been included for budget purposes. This means that in order to make the project feasible such incomes are already been budgeted as income sources for the project. The transmission Line project itself is a social project which improves quality standards for population and enhances development options. Funds for the project activity would be available thanks to Else's initiative; moreover, the company does not receive any additional public funding or subsidy from the government.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funds from any national or international source are involved in the project activity. The project activity is implemented with Else internal resources.

Annex 3

BASELINE INFORMATION

I. NATIONAL REGULATION

- **Electricity concessions law (Decree-Law Number 25844) and its regulatory supreme Decree Nº 009 – 93 – EM.**
  Establish the legal provisions with respect to the regulatory issues on generation, transmission, distribution and commercialization of electricity. The Ministry of Energy and mining and OSINERG on behalf of Peru's government and considering its surveillance functions shall oversee compliance of this law. Generation, transmission and distribution activities could be carried out by national or international individuals or companies.

  This regulatory framework has enabled a very effective electricity sector reform with remarkable results for the country. This reform entails a reliable electricity supply, an efficient system performance and the setting of tariffs for end users giving careful consideration to availability of energy resources.

- **Promotion of natural gas industry: Law N° 27133 and its regulatory decree N° 040-99-EM.**
  The main objective is to establish specific conditions in order to enhance development of natural gas industry. To do so, it promotes competitiveness and diversification of energy resources, increasing electricity supply reliability and consequently boosting competitiveness of the industrial sector in the country.

- **Promotion of energy efficiency, Law N° 27345**
  The law intends to guarantee energy supply, protect consumer's rights, enhance national competitiveness and reduce environmental impacts from energy use and consumption.

- **Promotion of concessions in hydroelectricity. Law N° 27435.**
  Temporary and definitive concessions on hydroelectricity generation are ruled by this law.
  Those concessions depend on guarantees to be proven by projects.

- **Rural, isolated and border regions electrification law. (Law N° 27744)**
  The law states that electricity in rural areas, isolated areas and border regions is a national need and a public interest. This statement aims at reinforcing socioeconomic development, as well as at improving living standards of rural population, fighting poverty, constraining migration from rural to urban areas, and finally, at promoting renewable and clean energy resources use.

- **Regulatory decree in cogeneration. (D.S. N° 064-2005-EM) and its substitution (D. S N° 037-2006-EM)**
  Regulatory framework for cogeneration established in order to promote diffusion of this technology. Conditions and requirements in which cogeneration developers can participate in the electricity market have been set in this decree as well.

- **Efficient electricity generation development law. (Law N° 28832)**
  Electricity concessions law has been clarified through the efficient electricity generation development law which seeks the following main objectives:

a) Ensure that efficient electricity generation will be sufficient to:
- Reduce risk exposure to highly volatile prices in Peru's electricity system
- Reduce long rationing periods consequence of limited energy offer
- Guarantee the most competitive electric tariff for end users.

b) Reduce administrative intervention in setting generation prices, promoting a market mechanism approach.
c) To adopt all necessary measures to foster effective competitiveness in generation market.
d) To introduce compensation mechanisms between SEIN and isolated systems so that prices from the latter include benefits from natural gas and reduce exposure to fuel markets volatility.

It is important to mention some definitions applicable for transmission activities in article 1 from this law. Item 21 defines the transmission Plan [(15)], item 30 defines guaranteed transmission system [(16)] and item 29 the complementary system [(17)]. In addition, chapter five deals with adjustments of the regulatory framework for transmission activities.

- **Ministry resolution Nº 552-2006-MEM/DM (Newsletter "El Peruano", 23rd of November 2006)**

By which the transitory transmission plan 2007 – 2008 is approved. The Plan outlines the projects under the guaranteed transmission system and the complementary transmission system. The project activity (transmission line San Gabán – Masuko – Puerto Maldonado) belongs to the complementary transmission system as a result of Else's initiative.

- **Directorial Resolution Nº 106 – 2007 – MEM/AAE (29th January 2007)**
  The Environmental impact assessment is approved by the Ministry of energy and mining.

[(15)] Periodic study approved by the Ministry in which a centralized analysis is used to establish the transmission equipment requirements necessary to maintain or improve quality, reliability, security or economy of a given system for a period of time not longer than 10 years. The result of this study is a complete plan of infrastructure works which considers all possible expansion scenarios of generation and growth in future demand, time schedule to achieve it and the allocation of compensations

[(16)] System comprising all the transmission assets or transmission installations built under the scope of the transmission plan and considered to be an energy priority. This leads to economic and technical support from the Government.

[(17)] Law 28832. Efficient electricity generation development law. Definition 29 and article 27, number 27.1: Project in the complementary system is a project outside the scope of the guaranteed transmission system, and thus outside the scope of the transmission plan.

II. DETERMINATION OF GRID EMISSION FACTOR

a) Required information

A summary of the information sources of the variables and parameters used for the calculation of the Baseline Emission Factor is shown below.

Variable	Unit	Source
Name	-	COES
Fuel Consumption by power plant	Fuel Oil (6) y Diesel = gallons (gal) Natural Gas = (kft^3) Coal = (tonne)	COES
Electrical Generation	MWh/year	COES
Fuel Characteristics (density VNC, carbon content, etc)	tonne/m $TJ/10^3$ tonne ^{3} tonne C/TJ Etc.	IPCC**

* "Comite de Operacion Economica del sistema interconectado Nacional", Operation Economic Committee of the National Interconnected System (www.coes.org.pe)

** Intergovernmental Panel on Climate Change (www.ipcc.ch)

Fuels

The following values were used in order to calculate fuel emission factors:

Fuel type	Density (tonne/m^3)	Emission factor ($KgCO_2/TJ$)	Factor de emission (tonne CO_2/ tonne)	Emission factor (tonne CO_2/ gal)
Fuel oil	0.96	77,400.0	3.12696	0.011363358
Diesel	0.88	74,100.0	3.18630	0.010614083
Crude oil	0.74	73,300.0	3.10059	0.008685387
Coal	-	98,300.0	2.69280	-

Fuel type	Density (tonne/m^3)	Emission factor ($KgCO_2/TJ$)	Emission factor (tonne CO_2/ Kft^3)
Natural Gas	0.00074	56,100.0	0.057023996

b) Procedure to determine the Emission Factor of the grid

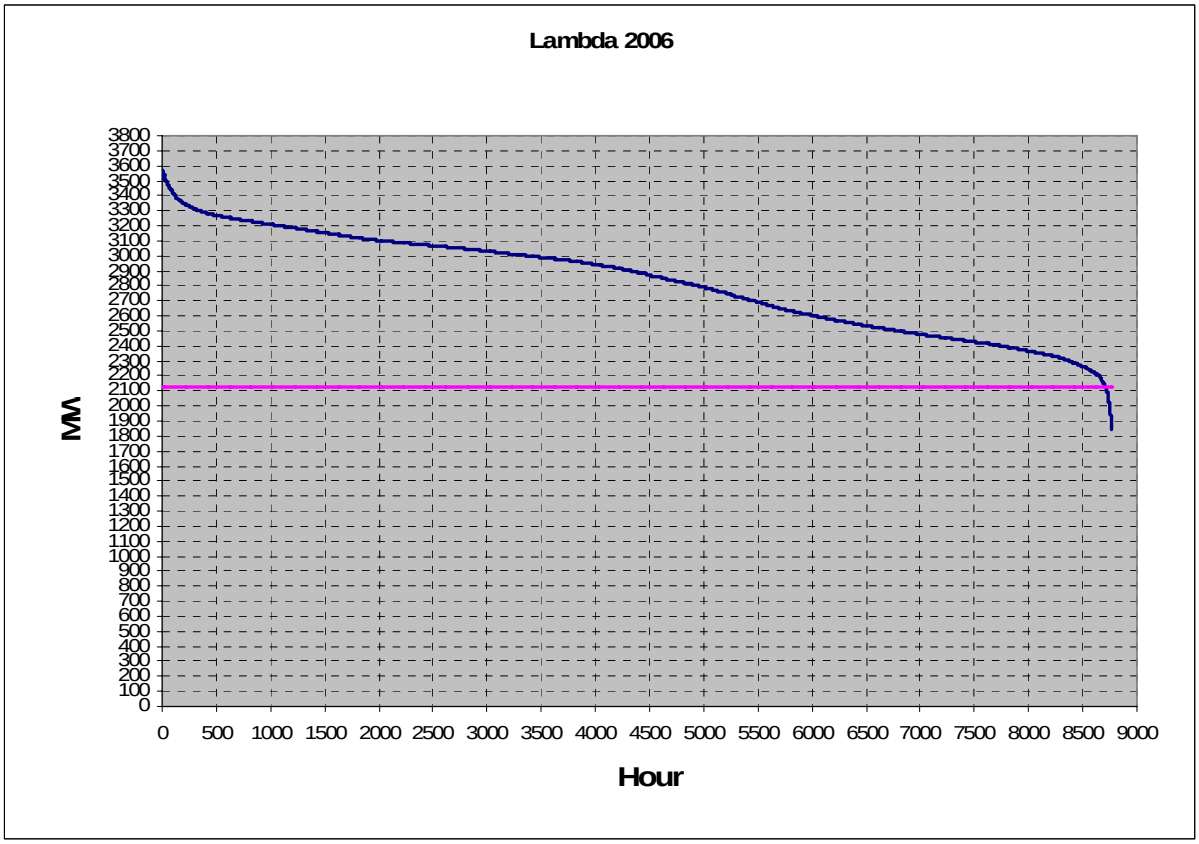
Operating Margin

The Simple Adjusted Method implies the following calculation for the prior 3 year previous to the presentation of the PDD.

Data 2006

Lambda 2006

□	=	0.00364
1- □	=	0.99636



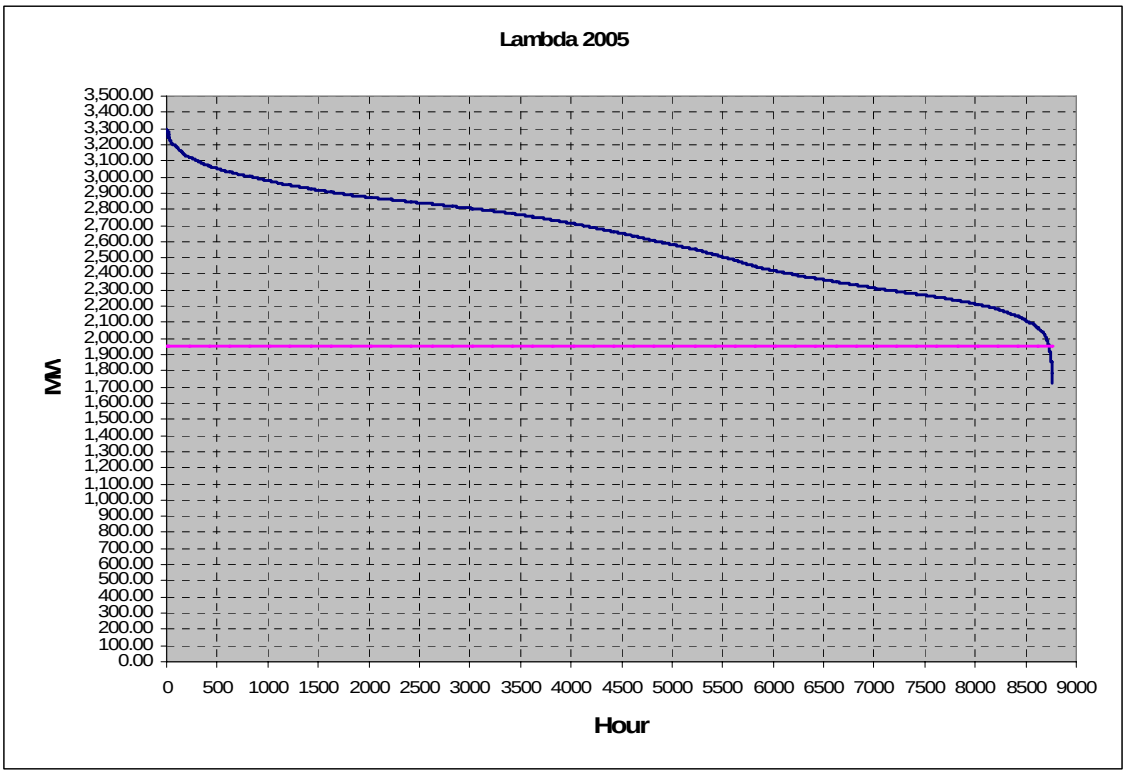
Annual Generation 2006

GEN (no Low Cost)	=	6,092,070	MWh
GEN (Low Cost)	=	18,670,710	MWh

Data 2005

Lambda 2005

. □	=	0.00355
1- □	=	0.99645



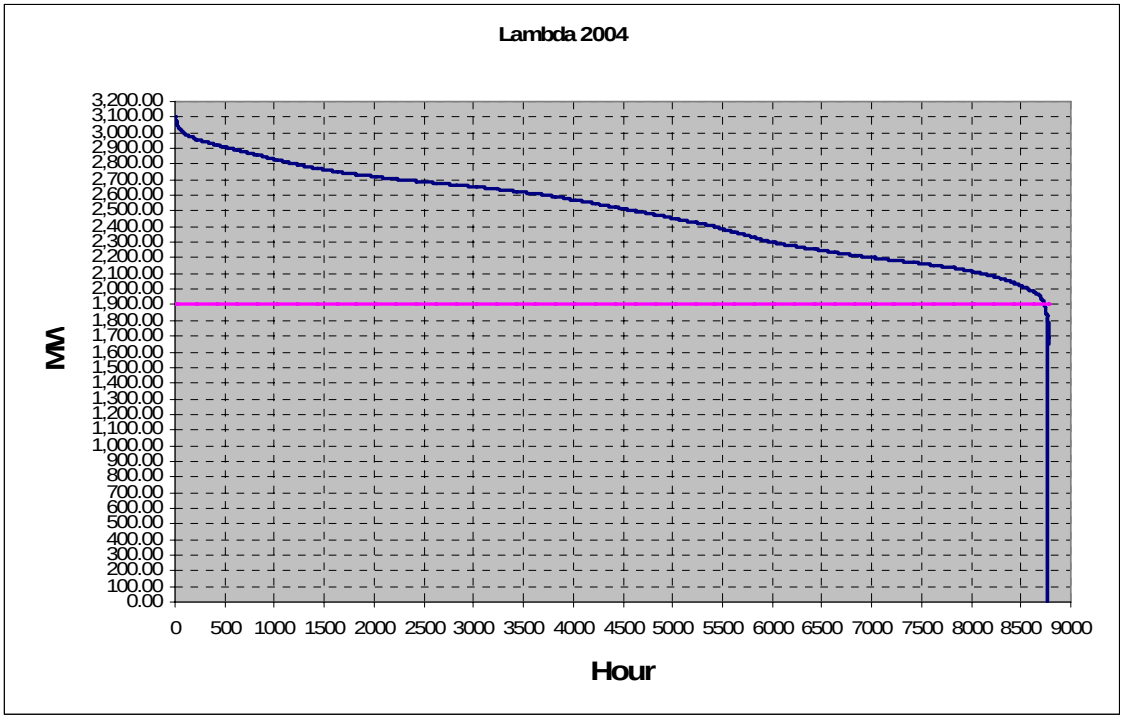
Annual Generation 2005

GEN (no Low Cost)	=	5,891,974	MWh
GEN (Low Cost)	=	17,100,838	MWh

Data 2004

Lambda 2004

. □	=	0.00548364
1- □	=	0.99451636



Annual Generation 2004

GEN (no Low Cost))	=	5,210,091	MWh
GEN (Low Cost)	=	16,692,999	MWh

The development of the equation of the Operating Margin (OM) emission factor is:

$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y).\frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_{j} GEN_{j,y}} + \frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_{k} GEN_{k,y}}$$

$$EF_{OM,simple\_adjusted,y} = \textbf{0.6855 t } \textbf{CO}_2 \textbf{ / MWh}$$

Build Margin

To determine the most adapted option for the group *m* of power plants, the criteria used in the methodology ACM0002 indicates that the participants of the project activity must choose for the group that includes the major annual generation of electricity. In this sense**:**

a) The five power plants that have been built most recently,

= 3,437,451.71 MWh

b) The power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

= **5,462,728.38 MWh**

Project participants should use from these two options that sample group that comprises the larger annual generation, in this case that is option b).

Power Plant	Generation (GWh)	Energy Accumulated (GWh)	%
Chilca I	89,494	89,494	0.36%
Ventanilla	1,767,451	1,856,945	7.50%
Santa Rosa	735,029	2,591,974	10.47%

Santa Rosa I	6,505	2,598,479	10.49%
Yuncan	838,972	3,437,452	13.88%
Misapuquio	30,310	3,467,761	14.00%
San Antonio	3,317	3,471,078	14.02%
San Ignacio	2,009	3,473,088	14.03%
Huayllacho	13	3,473,100	14.03%
Yarinacocha	73,767	3,546,868	14.32%
Huanchor	132,926	3,679,793	14.86%
Machupicchu	740,373	4,420,167	17.85%
San Nicolas	105,942	4,526,109	18.28%
Tumbes	42,378	4,568,487	18.45%
Chimay	894,242	5,462,728	22.06%

The fuel consumption for the group (m) of selected power plants is:

Fuel Type	Unit	Value
Fuel Oil 6	Gal	6,974,629
Diesel 2	Gal	2,498,470
Fuel Oil 5	Gal	9,484,381
Natural Gas	Kft^3	23,833,074
Coal	Tonne	0

The development of the equation of the Build Margin (BM) emission factor is

$\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}$ = 1,572,606 t CO_2

$\sum_{m} GEN_{m,y}$ = 5,462,728 MWh

$EF_{BM,y}$ = **0.2879 t CO_2 / MWh**

Emission factor of the grid

The emission factor of the project is calculated ex ante using the following formula:

$$EF_{p,y} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

$$= 0.5 \cdot 0.6855 + 0.5 \cdot 0.2879 \text{ t \onne } CO_2e/MWh$$

= 0.4867 tonne **co_2e/MWh**

Annex 4

MONITORING INFORMATION

The project will proceed with the necessary measures for the power control and monitoring.
Together with the information produced by ELSE and COES – SINAC, it will be possible to monitor the power of the project and the grid power mix.

MONITORING PLAN

Management of Project Registration, Monitoring, Measurement and Reporting

The Project Developer's Head Office will have final responsibility for all aspects related to data measurements, monitoring of data recording and emissions and will sign off all reports on monitoring.
Data will be collected and consolidated by the On-site Technician and Chief of Operation Area. The last one will also draw up the monthly and annual emission reduction monitoring reports.
Data will be recorded at regular intervals. The actual measured data will be entered into an "ER Spreadsheet" or an equivalent informatic system to calculate the emission reductions for the period.

Training of Monitoring Personnel

Personnel will have proper training for the implementation of the CDM project activity. Procedures related to this will be in compliance or will be the same procedures developed for the normal operation of the project.

Calibration of monitoring equipment

The company has developed many procedures which would be applicable to this project activity. These ones will be applied in the project activity operation.

Monitoring data adjustment procedures

Data will be collected on daily and monthly basis and consolidated on a monthly basis where the data will be checked for quality control purposes when possible (invoices, other measurements and official data). If there are discrepancies in the data, the source of the variation will be identified, be it the main measured value or the quality control value. The incorrect value will be deleted and the measured data compared to historical and predicted values before being finally recorded.

Data and reports review procedures

Data will be reviewed by the Chief of Operation Area and signed off on a monthly basis again predicted and historical values. Should there be discrepancies in the data the procedure indicated above will be followed to adjust the data.

Internal GHG audit procedures

There are no requirements for internal audits of GHG project compliance with the company operational requirements.

Operational procedures and responsibilities for monitoring and quality assurance of emissions reductions from the project activity are presented in the next table:

Task	On-site technician	Chief of Operation Area	Project developer's head office	Head of Maintenance / External company
Collect Data	E	E/R	N/A	N/A
Enter data into Spreadsheet/informatic system	N/A	E	R	N/A
Make monthly and annual reports	N/A	E	R	N/A
Archive data & reports	N/A	E	E	N/A
Calibration / Maintenance	I	R	I	E

(E = responsible for executing the task, R = responsible for overseeing and assuring quality, I = to be informed