CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	•The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. •As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	•The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 .a Title of the small-scale project activity:

EL BOTE Small Hydroelectric Plant

A.1 .b Version and date of the PDD

Version 10 - - - March 15th 2010

A.2. Description of the small-scale project activity:

A.2.1. Purpose of Project Activity.

The municipalities of El Cuá and San José de Bocay cover more than half of the northern province of Jinotega, NICARAGUA and have a high potential, but an underdeveloped capacity, for agricultural and forestry production. Of the population that existed in 2003 (more than 70,000 people in the two Municipalities) only 7% had access to electrical service. The lack of electrification limited the economic and social development of the zone.

The objective of the Project is to generate hydroelectricity for sale to the local communities of El Cuá and San José de Bocay municipalities, with any excess power to be sold to the national grid. The alternative was to continue the electrification of this rural area with electricity purchased from the national grid, which would have been derived from the mixture of fuels that supply the national Nicaraguan grid, predominantly petroleum. The supply of electricity to the local communities will stimulate growth of the local economy. The hydro plant will also serve as a focus for watershed conservation efforts. The project will serve as a demonstration of a small-scale hydroelectric generator, providing electric service in a rural concesion area and also intertied to the national Nicaraguan electric grid, being thereafter replicable in other neighboring areas of Nicaragua that have similar hydrologic potential.

The investment made in the CDM activity, consists in the construction costs of the **El Bote** hydro plant with 940 kW of installed capacity.

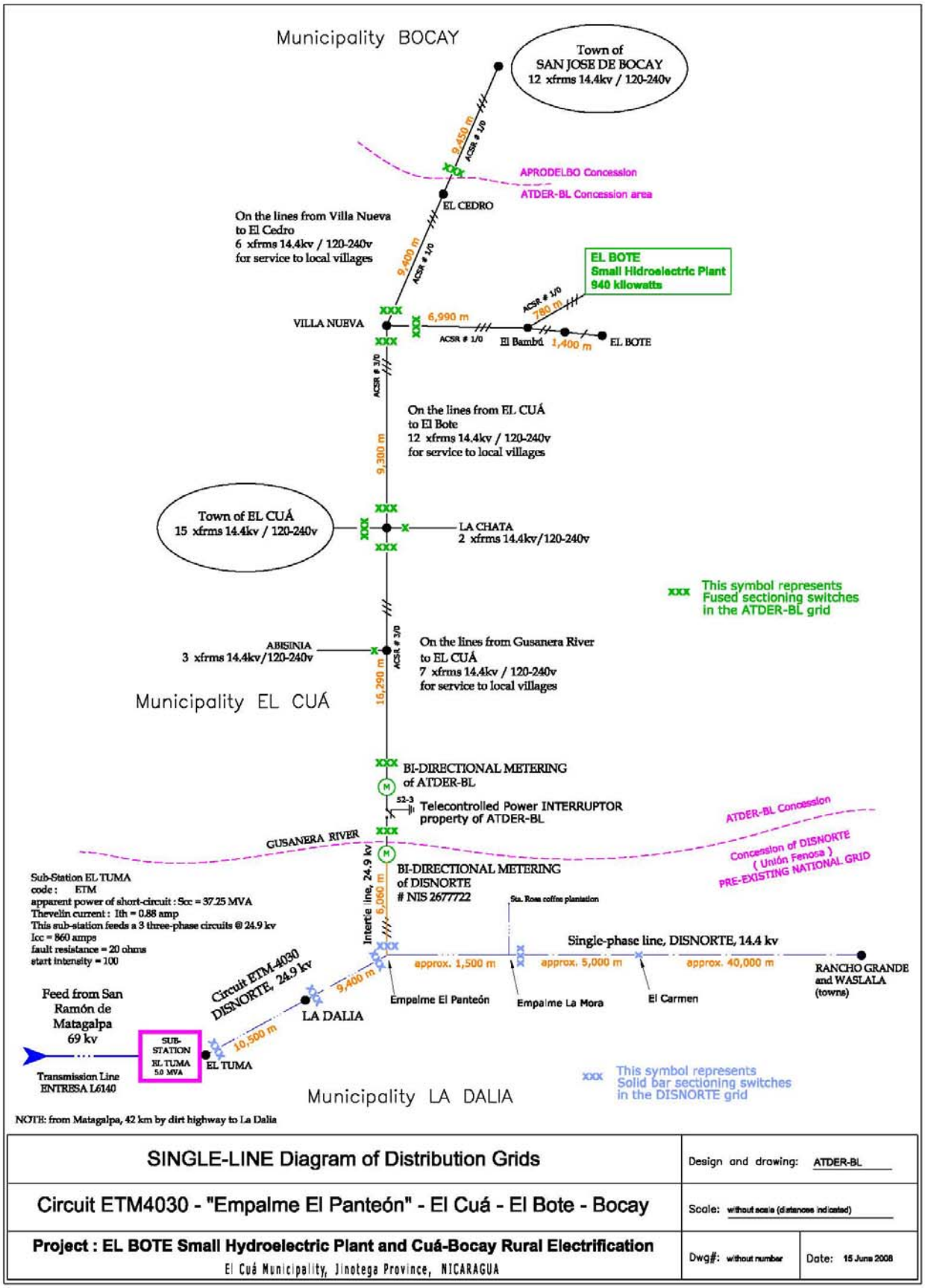
The projected yearly average generation of the **El Bote** hydroelectric plant is 5.8 Gigawatts hours (GWh). The project expects to displace 53,998 tons of carbon dioxide equivalent (tCO_2e) in the 14-year crediting period. The CERs are calculated on the basis of recent years of the national grid generation mix, since the project displaces electricity from the national grid.

The small hydro plant of **El Bote** was designed and built by ATDER-BL. ATDER-BL is a non-governmental organization (NGO) which also designed and built small isolated hydroelectric plants in San José de Bocay and La Pita de Carmen, in the same area. The infrastructure of the El Bote plant has already been built, and a plan for the expansion of the electrical grid is in process to extend electrical service to more users. The beneficiaries of the village of El Bote and other nearby rural communities voluntarily contributed the unskilled manual labour for the construction of the civil works of the **El Bote** hydro plant.

The Concession for generation and distribution of electricity has been granted by the Nicaraguan Institute of Energy (I.N.E., the national energy regulatory authority). All legal requirements have been satisfied. The hydroelectric plant has been built and is operating, and does not require any further studies or permits. The Carbon Credit revenues will contribute to the sustainability and expansion of electric service to the rural communities located in the local Concession area while providing greater security for payment of the debt incurred in construction of the hydroelectric plant. A map and single-line diagram on the next pages show the location and configuration of the El Bote Small Hydroelectric Plant Project.

Location of the EL BOTE Small Hydroelectric Plant
NICARAGUA, Central America

ATDER-BL


Municipality BOCAY
Town of
SAN JOSE DE BOCAY
12 xfrms 14.4kv / 120-240v
9,450 m
ACSR # 1/0
APRODELBO Concession
ATDER-BL Concession area
EL CEDRO
On the lines from Villa Nueva
to El Cedro
6 xfrms 14.4kv / 120-240v
for service to local villages
9,400 m
ACSR # 1/0
EL BOTE
Small Hidroelectric Plant
940 kilowatts
VILLA NUEVA
6,990 m
ACSR # 1/0
780 m
El Bambú
1,400 m
EL BOTE
ACSR # 3/0
On the lines from EL CUÁ
to El Bote
12 xfrms 14.4kv / 120-240v
for service to local villages
9,300 m
Town of EL CUÁ
15 xfrms 14.4kv / 120-240v
LA CHATA
2 xfrms 14.4kv/120-240v
This symbol represents
Fused sectioning switches
in the ATDER-BL grid
ABISINIA
3 xfrms 14.4kv/120-240v
ACSR # 3/0
On the lines from Gusanera River
to EL CUÁ
7 xfrms 14.4kv / 120-240v
for service to local villages
16,290 m
Municipality EL CUÁ
BI-DIRECTIONAL METERING
of ATDER-BL
52-3
Telecontrolled Power INTERRUPTOR
property of ATDER-BL
ATDER-BL Concession
GUSANERA RIVER
Concession of DISNORTE
(Unión Fenosa)
PRE-EXISTING NATIONAL GRID
Sub-Station EL TUMA
code : ETM
apparent power of short-circuit : Scc = 37.25 MVA
Thevelin current : Ith = 0.88 amp
This sub-station feeds a 3 three-phase circuits @ 24.9 kv
Icc = 860 amps
fault resistance = 20 ohms
start intensity = 100
Intertie line, 24.9 kv
6,060 m
BI-DIRECTIONAL METERING
of DISNORTE
NIS 2677722
Sta. Rosa coffee plantation
Single-phase line, DISNORTE, 14.4 kv
approx. 1,500 m
approx. 5,000 m
approx. 40,000 m
RANCHO GRANDE
and WASLALA
(towns)
Empalme El Panteón
Empalme La Mora
El Carmen
Circuit ETM-4030
DISNORTE, 24.9 kv
9,400 m
LA DALIA
Feed from San
Ramón de
Matagalpa
69 kv
SUB-
STATION
EL TUMA
5.0 MVA
EL TUMA
10,500 m
Transmission Line
ENTRESA L6140
This symbol represents
Solid bar sectioning switches
in the DISNORTE grid
Municipality LA DALIA
NOTE: from Matagalpa, 42 km by dirt highway to La Dalia
SINGLE-LINE Diagram of Distribution Grids
Design and drawing: ATDER-BL
Circuit ETM4030 - "Empalme El Panteón" - El Cuá - El Bote - Bocay
Scale: without scale (distances indicated)
Project : EL BOTE Small Hydroelectric Plant and Cuá-Bocay Rural Electrification
El Cuá Municipality, Jinotega Province, NICARAGUA
Dwg#: without number
Date: 15 June 2008

A.2.2. Contribution to Sustainable Development.

Without implementation of the project the electrification of the Cuá–Bocay area would have proceded with energy from the national grid produced with a mix of fuels. Prior to the initiation of the Project, the electrification of the Cuá-Bocay area was very unsatisfactory, with one isolated diesel plant operating in the town of El Cua (with limited and very expensive electric service 18 hours per day), and two very small isolated hydroelectric plants built by ATDER-BL operating in the communities of Bocay and La Pita. These very small hydros did not have capacity to supply demand outside their local grids (500 houses and small businesses in Bocay, and 60 houses in La Pita). The construction of the electric intertie line and local secundary grids in the years 2004 and 2005 permitted service to the local communities with electricity (derived from mixed fuels) purchased from the national grid during a period of approximately 2 years before the El Bote hydro plant entered in operation. Now GHG emission-free hydroelectricity from the El Bote hydroelectric plant supplies the entire demand of the local grid, and excess hydroelectricity not consumed by the local demand is being injected into the national grid where it also displaces energy previously generated by the fuel mix (predominantly petroleum) used by the plants of the larger national grid system.

Besides the global benefit of displacing Carbon, and the local benefit of rural electrification, the project also provides a focus for watershed conservation of the El Bote (25 km^2) watershed.

Also the project contributes to sustainable development by:

a) Employing local labor in construction and in operation.

b) Improving electrical access by serving demand centres that suffer blackouts due to difficulties in the existing power lines. Due to the project, improvements have been made to the power line that the project's transmission line is intertied to.

c) Serving as a small demonstrative project for clean renewable electricity generation in the country, which can also function as an independent power producer ("IPP") when developed by a private NGO.

d) Contributing to government revenue through the payment of taxes.

e) Helping the country improve the hydrocarbons trade balance through reduction of petroleum imports used for electricity generation – Nicaragua imports all of its petroleum.

A.3. Project participants:

A. Organization for the Construction and Operation of the Project

The Association of Rural Development Workers–Benjamín Linder (ATDER-BL) is a non-governmental, non-profit organization with a twenty year history of working in the municipalities of El Cuá and San José de Bocay in the department of Jinotega on small hydroelectric projects, watershed conservation, rural electrification, rural drinking water systems, mechanization, sustainable development, technical education & training, etc… ATDER-BL obtained legal status as a Nicaraguan non-profit NGO in 1994. The principal office of ATDER-BL is located in the city of Matagalpa and the field office is located in the town of El Cuá.

ATDER-BL has developed the project with the active participation of the beneficiary communities of El Bote, El Galope and Chico Estrada who contributed volunteer manual labour in the construction of the civil works of the small hydro plant. In order to organize the volunteer work, the communities of El Bote, El Galope and Chico Estrada formed Electric Committees that consist of community leaders who dedicated their time without pay to ensure a successful outcome of the community organizing work.

In the course of construction, the technical and administrative personal were trained that were needed for the operation and maintenance of the hydro power plant.

The hydroelectric plant construction costs were financed by a bank loan. Operation of the system, collection of revenues from electricity sales and repayment of the loan, is managed by the NGO ATDER-BL which has the title to the Concession for generating and distributing electricity in the local influence area of the project.

B. Support and Commitments of Governmental Organizations & Others

- **Ministry of Energy and Mines (MEM)**
  The MEM provided part of the money for building the electric lines from the El Bote hydro plant to the local grids of El Cuá and San José de Bocay and to the national grid. Energy generated in excess of local demand would be sold to the national grid at a low price, which is of interest to the Ministry of Energy and Mines.

- **Institute of Rural Development (I.D.R.)**
  The I.D.R. is the Nicaraguan government agency in charge of rural economic development. The IDR supported construction of an access road to the site of the El Bote powerhouse and to the nearby village of La Samaria. The beneficiary communities provided volunteer manual labour for the construction of this road. The road provides access to the powerhouse of the hydroelectric plant and also provides a route by which the agricultural production of the farm families of La Samaria is transported to local markets.

- **Municipal Government of El Cuá**
  The El Cuá municipal government fully supports the El Bote hydro project and the rural electrification of the municipality, providing letters of support and all other formalities required for the project, although they have not provided any funds..

- **COSUDE - Government of Switzerland**
  Supported construction of the electrical distribution grid.

- **Manos Unidas (United Hands) - Catholic Church of Spain**
  Donated for the construction of parts of the electrical distribution grids.

- **Alliance in Energy and Environment - Finland-Central America, ABB-Finland**
  To promote the company, ABB-Finland established a collaboration for the installation of the control system of the El Bote hydroelectric plant.

- **Benjamin Linder Memorial Fund – USA** Provided support for the design phase of the project.

- **UICN,** provided funds for purchase of forest reserve lands in the watershed.

- **EMPOWER – USA Non-governmental Organization,** provided a small fund for training of lines workers and electricians from the local communities.

A.4. Technical description of the small-scale project activity:

The project uses conventional, well-proven technology for small hydroelectric plants. The technology of the El Bote hydro plant is very similar to that of the small hydro plants already functioning in Bocay and La Pita, though on a larger scale.

Technology:

Weir/Reservoir

The project is designed as "run of the river". The purpose of the dam/weir (less than 3 m in height) is primarily to obtain sufficient depth of water to ensure that water can enter and fill the pipeline and excess water can flow over the weir and continue along the natural course of the river. The live capacity of the head pond with flash boards is 5,500 m^3, and the volume of dead storage is estimated to accommodate one year of sediment. A low level outlet

through the base of the weir with dimensions of 80 cm by 80 cm permits the draining of the reservoir and assists with the cleaning and maintenance of the reservoir, weir and intake structure. A sluice gate controls the opening and closing of the low level outlet and it is operated by hand wheel from the crest of the weir. The small amount of live storage capacity of the head pond allows some flow regulation of the river which during the dry season can provide an increase in available water to meet the daily peak demand of the local market. The head pond has a surface area of 1,350 m^2.(approximately 30 m wide x 45 m long).

Pipeline

The pipeline is 385 m in length and is constructed of 24" and 30" diameter PVC and steel pipe. The majority of the pipeline is buried except for first section at the weir intake, a section in the middle that is on bedrock, and a final 36 m long section that is very steep to the powerhouse. PVC was chosen as a pipeline material due to its low cost, low friction factor, ease of assembly, it is corrosion free and because of its relative lightness. The three sections of the pipeline that could not be buried in a ditch due to irregular and rocky terrain is constructed of steel pipe. The steel pipe has an epoxy liner and several exterior coats of specialized paint to prevent interior and exterior corrosion. The pipeline was chosen to permit a design flow of 1.05 m^3/s resulting in a water velocity of between 2.2 m/s to 3.8 m/s. The total hydraulic losses through the intake, the trashrack, and the pipeline are calculated as 6.7 m, with a net head for the project of 112.7 m, at design flow.

The soil above the buried pipeline is 0.5 m in depth and has been planted with Vetiver grass to prevent soil erosion. Four air/vacuum valves have been installed to prevent accumulation of air or the creation of vacuums in the pipeline. Reinforced concrete anchors were built at points of deflection and at the reduction in the pipeline to prevent movement by hydraulic forces that are created at these locations. A manually operated 4" dia. gate valve has been provided on a "T" to the bottom section of the pipeline, immediately before the powerhouse pipe bifurification to permit the cleaning of any sediment that may accumulate in the pipeline.

Electro-Mechanical Equipment

The electro-mechanical equipment installed in the El Bote powerhouse consists of two sets of turbine/generator. Each 470 kW turbine/generator set consists of:

- a horizontal shaft pelton turbine with two nozzles, with deflectors for each nozzle
- a shut-off butterfly valve
- a dresser coupler with bolt harness between butterfly valve and turbine to permit assembly, disassembly and repair of the turbine
- direct-drive coupler between turbine and generator
- a synchronous generator with flywheel, 514.33 rpm, 480 V, 60 kVA
- hydraulically actuated turbine injectors to regulate water flow and meet electrical demand when operating in island mode. And to regulate flow based on the level of water in the reservoir while connected to the national grid
- control panel for start-up, shut-down, regulation, synchronization, surge, lightning and other electrical protection

When operating at design flow and at design load the efficiency of the turbine and generator is 79.4 % and 95.9 % respectively.

The electro-mechanical equipment in the El Bote powerhouse has the capacity for isolated operation (island mode) and also operation while connected and synchronized to the national grid (intertie mode).

.4.1. Location of the small-scale project activity:

The El Bote Small Hydro Project is located in the municipality of El Cuá, Department of Jinotega, in northern Nicaragua. The project is 215 km northeast of the capital-city of Managua and 20 km northeast of the town of El Cuá. The coordinates of the project in UTM are 655 470 E and 1480 930 N, equivalent to Longitud 85°33'24" East and Latitude 13°23'36" North.

A.4.1.1. Host Party(ies):

Nicaragua

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

Department (province) of Jinotega.

A.4.1.3. City/Town/Community etc:

El Bote.

A.4.1.4.Details of physical location, including information allowing the unique identification of this small-scale project activity :

The El Bote Small Hydro Project is located in the municipality of El Cuá, Department of Jinotega, in northern Nicaragua. The project is located 1 km north of the village of El Bote. The dam has been constructed in a section of the El Bote river just above a set of falls at approximately 615 m above sea level. From this point the river falls 120 m in elevation over a horizontal distance of 350 m to the powerhouse.

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

Type I: Renewable Energy Projects. Category D: Renewable electricity generation for a grid. AMS-I.D.
NOTE: Version 14 of the Methodology has been used in the preparation of this PDD.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The project will displace electricity from a relatively carbon-intensive grid with a combined margin emission factor of 0.665 t CO_2 / MWh. The project is expected to displace 5800 MWh of electricity per year, thus reducing GHG emissions on 3,857 t CO_2 - e per year in the baseline scenario. Expected emissions from the hydroelectric plant have been calculated at 0 t CO_2 equivalent per year. Therefore, total emission reduction expected in the period are:

In a period of 7 years : (5,800 x 0.665 x 7) = 26,999 tonnes CO_2-equivalent
In a period of 14 years : (5,800 x 0.665 x 14) = 53,998 tonnes CO_2-equivalent

A.4.4. Public funding of the small-scale project activity:

There is no public funding from an Annex I party for the El Bote hydroelectric plant.

Funding	Name of Financier	Amount US$	Status
Existing Cash Flow			
Equity	Private and ATDER-BL funds	$ 510,844	have
Bank Loan	World Bank Program (PERZA), administered by FNI (Financiera Nicaraguense de Inversiones)	$ 1,301,465.00	received
Other	Beneficiaries Communities	$ 77,484	received
Total	(approx)	**$ 1,889,793**	

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

The project is not deemed to be a debundled component of a large project activity because there is not a registered small-scale CDM project activity or an application to register another small-scale CDM project:
-With the same project participants
-In the same project category and technology/measure;
-Registered within the previous 2 years; and
-Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

As of this date, this is the only CDM for hydropower generation for which the sponsor (ATDER-BL) has applied.

SECTION B. Application of a baseline and monitoring methodology

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

According to the latest version of Appendix B, the type and category of the project activity is as follows:
-Type I: Renewable Energy Project
-Category D: Renewable electricity generation for a grid

The monitoring methodology is in line with the approved monitoring methodology **AMS-I.D. grid-connected renewable electricity generation"**

B.2 Justification of the choice of the project category:

The project falls into project category I.D. because it is a hydropower plant that will supply renewable electricity to a grid. The combined margin emission factors of the grid are calculated using the **"Tool to calculate the emission factor for an electricity system" (version 01.1).**

The chosen baseline calculation is the average of the "approximate operating margin" and the "build margin". The baseline calculation chosen was deemed to be superior on its compliance with the Marrakech Accords ("MA")'s baseline definition, than the weighted average emissions of the current generation mix for two reasons: a) The project is more likely to mitigate fossil fuel-based electricity generation than hydro electricity generation given the NIS dispatch characteristics; this operational fact of the NIS, would have been completely ignored if the weighted average emissions (in $KgCO_2/KWh$) of the current generation mix had been considered the project's baseline. However, it is taken into account (with a weight of 50%) in the baseline chosen as the approximate operating margin excludes renewable energy sources **(low-cost / must-run resources constitute less than 50% of total grid generation**), and b) The build margin is a more dynamic component for the baseline than the weighted average emissions (in $KgCO_2/KWh$) of the current generation mix, since the build margin focuses on the emission from the most recently-built plants. At the same time, the build margin is also conservative as it is based on weighted average emissions (in KgCO2/KWh) of a generation mix that does not exclude any type of electricity generation technology. In summary, it was deemed that this 50%-50% combination of both margins (approximate operating margin and build margin) explained better what would happen in the absence of the project activity than the weighted average emissions (in $KgCO_2/KWh$) of the current generation mix.

B.3. Description of the project boundary:

The project boundary is defined as the notional margin around a project within which the project´s impact (in terms of carbon emission reduction) will be assessed. As referred to in AMS-I.D the project boundary has to be assessed in terms of the emission sources and spatial extent.

- **Emission sources**: This refers to the geographical site where power expansion facilities could be located. The El Bote hydro plant presently reduces greenhouse gas emissions from the petroleum-buring plants of the Nicaraguan national grid that are located in the Nicaraguan provinces of Managua, Leon and Chinandega. More fossil-fuel and other types of power plants are likely to be installed within the national territory of Nicaragua to meet expanding energy demand on the national level.

- **Spatial extent**: The spatial extent of the project boundary includes the project site and all grids and power plants connected physically to the electric system that the El Bote mini hydro plant is connected to. El Bote is connected to the national Nicaraguan grid. The Nicaraguan grid is intertied to the high-voltage transmission lines of Guatemala, El Salvador, Honduras, Costa Rica and Panama. However, during recent years the volumes of electricity imported and exported have been relatively low.

- **Project Boundary**: The project boundary is hence taken to be the limits of the territory of the Republic of Nicaragua, where the power plants are located that emit greenhouse gases which El Bote partially reduces. Within this same national boundary future power plants may reasonably be expected to be installed in the medium-term future that will contribute to the mixture of fuels of the system.

See map of the national Nicaraguan grid and location of the generating plants, including the El Bote hydroelectric plant, in Annex 6. This map illustrates the concept of the "project boundary".

For the baseline determination only CO_2 from electricity displaced due to the Project is accounted for.

B.4. Description of baseline and its development:

The methodological tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin"(BM) as well as the "combined margin" (CM). The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity.

The tool may be referred to in order to estimate the OM, BM and/or CM for the purpose of calculating baseline emissions for a project activity that substitutes electricity from the grid.

Following the criteria of this methodology, the procedure here chosen (analysis of 6 years of national generation statistics taking into account the types of fuels utilized) is the more conservative, when compared to the "electric fuels mix of the year 2007" which is the other alternative offered by the methodology.

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 small-scale CDM project activity:

Without implementation of the project, the electrification of the Cuá Bocay area, similar to other rural areas of Nicaragua, would be based on extension of local grids with electricity supplied from the national grid, consuming the mix of fuels that are utilized in the power plants of the national grid.

Energy and petroleum prices have risen in Nicaragua during the past few years. However, renewable energy generating plants such as hydroelectric plants are still not economically attrative to investors, due to the much higher initial investment cost per kw of installed capacity, compared to petroleum-burning plants for electricity generation.

The project has been initiated to supply electric service to an extensive rural area of Nicaragua where this basic service was lacking. Two options were possible: (1) extension of electric lines from the national grid, or (2) build the El Bote small hydro plant to supply the electricity required.

The El Bote project is a social project managed by a non profit NGO with the objective of extending rural electrification in the poor communities of Northern Nicaragua. Income from CERs is very important for the financial sustainability of this project, as shown in Annex 5:

With sale of Carbon Credits (US $ 20 / tCO_2e), the IRR is 12.6% and the NPV is US$ 39351. (See Financial Analysis WITH CERs at 20 years in Annex 5).

Without sale of CERs the IRR would be 7.9% and the NPV would be negative (US$ -242577). (See Financial Analysis WITHOUT CERs at 20 years in Annex 5). The CERs are hence needed to complete the financial sustainability of the project while continuing to expand the electric service to more rural communities in the local area.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the methodology, emission reductions in year *y* ***ERy*** (tCO_2e/year) are calculated as follows:

ERy = BEy – PEy – LEy

where
BEy = Baseline emissions in year *y* (tCO2e/year)
PEy = Project emissions in year *y* (tCO2e/year)
LEy = Leakage in year *y* (tCO2e/year)

According to the methodology and the tool, project emissions (PEy) and leakage (LEy) are zero.

For hydro power plants with power density (PD) greater than 10 W/m^2, PEy=0.

El Bote power density (PD) is: PD= 940000 W / 1338 m^2 = **702.54 W/m^2**

Thus, the baseline emissions ***BEy*** (tCO2/year) are given by:

BEy = EGy X EFgrid,CM,y

where
EGy = Annual electricity supplied by the project activity to the grid (MWh/year)
EFgrid,CM,y = Combined margin CO2 emission factor of the grid (tCO2/MWh)

Thus, emission reductions in year *y* ***ERy*** (tCO2e/year) results to be:

ERy = BEy = EGy X EFgrid,CM,y

The combined margin emission factor of the grid are calculated using the "Tool to calculate the emission factor for an electricity system" (version 01).

The Tool indicates that the emission factor of the grid is determined by the following six steps:

STEP 1. Identify the relevant electric power system.

STEP 2. Select an operating margin (OM) method.

STEP 3. Calculate the operating margin emission factor according to the selected method.

STEP 4. Identify the cohort of power units to be included in the build margin (BM).

STEP 5. Calculate the build margin emission factor.

STEP 6. Calculate the combined margin (CM) emissions factor.

Step 1. Identify the relevant electric power system
For the proposed project activity, the relevant electric power system is the entire national grid of Nicaragua.

For the purpose of determining the build margin emission factor, the spatial extent is also taken to be the national grid of Nicaragua including all generating plants that feed the national grid.

Step 2. Select an operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,2007}$) is based on simple operation margin method (option A of the Tool) because low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years.

Power generation in Nicaragua * (GWh)							
Type	**Low cost or must run**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Fuel oil	no	1830,78	1873,99	1954,87	1842,16	1989,00	1908,90
Diesel oil	no	11,11	18,86	26,00	25,34	69,13	206,94
Bagasse	no	95,79	134,10	127,92	203,43	194,35	235,29
Hidroelectric	yes	296,05	291,76	311,41	426,25	299,25	300,56
Geothermal	yes	191,22	242,40	227,16	241,21	276,98	211,06

- Source: Generación neta por tipo de combustible (INE) http://ine.gob.ni/ and official letter from INE to Aleyda Morales (ATDER-BL)

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	
Total generation (GWh)	2424,95	2561,11	2647,36	2738,39	2828,71	2862,75	
Low cost or must run (Gwh)	487,27	534,16	538,57	667,46	576,23	511,62	
Low cost or must run (%)	20,09	20,86	20,34	24,37	20,37	17,87	**< 50 %**

Additionally, the ex ante option is selected among the two options proposed by the Tool: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

Step 3. Calculate the operating margin emission factor according to the selected method.

The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It is calculated based on data on fuel consumption and net electricity generation of each power plant/unit (option A of the Tool).

Thus, the operating margin emission factor $\boldsymbol{EF_{grid,OM,simple,y}}$ (tCO_2e/MWh) is obtained as follows:

$$\boldsymbol{EF_{grid,OM,simple,y}} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year *y* (tCO_2/MWh)

$FC_{i,m,y}$ = Amount of fuel *i* consumed by the power plant/unit m in the year *y* (mass or volume units/year)

$NCV_{i,y}$ = Net calorific value of fuel *i* in the year *y* (TJ/mass or volume units)

$EF_{CO2,i,y}$ = CO_2 emission factor of fuel *i* in the year *y* (tCO_2/TJ)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power plant/unit *m* in the year *y* (MWh/year)

m = All power plants/units serving the grid, excluding the low-cost/must run power plants/units and including imports to the grid

i = All fosil fuel combusted in power plant/unit *m*

y = Either the three most recent years for which data available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

GRID EMISSION FACTOR FOR 2005. OPERATING MARGIN CALCULATION ($EF_{grid,OMsimple,2005}$)

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	419,68	-	-	33536,96	121872,78
.Managua (GECSA)	179,17	-	-	15311,28	55640,95
.Censa Amsfels	319,61	-	-	20002,95	72690,40
.Empresa Energética de Corinto	523,87	66,76	214,81	31348,35	113919,40
.Tipitapa Power Company	399,83	-	-	24472,21	88931,62
.Generadora San Rafael S.A.(GESCARSA)	0,00	-	-	-	-
.Nic. Sugar Estate Ltd. (NSEL)	113,60	-	-	-	-
.Monte Rosa	89,83	-	-	-	-
.Chinandega (GEOSA)	0,49	68,82	221,43	-	-
.Las Brisas (GECSA)	24,85	2000,85	6437,91	-	-
.Hugo Chávez (GECSA)	0,00	-	-	-	-
Total	2070,93	2136,43	6874,16	124671,75	453055,15

Density diesel: 0.85
Density fuel oil: 0.96
Gallon / litres: 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor ($tCO_2/TJ)x10^{-3}$	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	6874,16	Gg	43,0	0,0741	3,1863	21903,12
Fuel oil	453055,14	Gg	40,4	0,0774	3,1270	1416685,30
Total						1438588,42

GWh/yr= 2070.93 in 2005.

Thus,

$EF_{grid,OMsimple,2005}$ (tCO_2/GWh)= 695

GRID EMISSION FACTOR FOR 2006. OPERATING MARGIN CALCULATION ($EF_{grid,OMsimple,2006}$)

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	546,15	-	-	43240,21	157134,23
.Managua (GECSA)	180,02	-	-	16283,07	59172,42
.Censa Amsfels	314,24	-	-	19381,3	70431,33
.Empresa Energética de Corinto	528,40	101,78	327,49	31744,26	115358,13
.Tipitapa Power Company	420,18	-		25597,28	93020,11
.Generadora San Rafael S.A.(GESCARSA)	0,00	-	-	-	-
.Nic. Sugar Estate Ltd. (NSEL)	100,42	-	-	27,01	98,15
.Monte Rosa	93,93	-	-	-	-
.Chinandega (GEOSA)	0,82	111,48	358,70	-	-
.Las Brisas (GECSA)	68,31	4909,66	15797,27	-	-
.Hugo Chávez (GECSA)	0,00	-	-	-	-
Total	2252,47	5122,92	16483,46	136273,13	495214,37

Density diesel: 0.85
Density fuel oil: 0.96
Gallon / litres: 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor (tCO_2/TJ)x10^{-3}	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	16483,46	Gg	43	0,0741	3,1863	52521,236
Fuel oil	495214,37	Gg	40,4	0,0774	3,1270	1548515,5
Total						1601036,8

GWh/yr= 2252.47 in 2006

Thus,

$EF_{grid,OMsimple,2006}$ (tCO2/GWh)= 711

GRID EMISSION FACTOR FOR 2007. OPERATING MARGIN CALCULATION ($EF_{grid,OMsimple,2007}$)

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	515,98	-	-	40967,7	148875,97
.Managua (GECSA)	211,42	-	-	17522,8	63677,57
.Censa Amsfels	217,65	-	-	13837,01	50283,47
.Empresa Energética de Corinto	550,12	108,63	349,53	32845,77	119361,00
.Tipitapa Power Company	409,24	12,95	41,67	25013,43	90898,40
.Generadora San Rafael S.A.(GESCARSA)	4,50	44,65	143,67	271,05	984,99
.Nic. Sugar Estate Ltd. (NSEL)	122,38	-	-	-	-
.Monte Rosa	112,90	-	-	-	-
.Chinandega (GEOSA)	0,00	1,12	3,60	-	-
.Las Brisas (GECSA)	107,12	10568,39	34004,75	-	-
.Hugo Chávez (GECSA)	99,81	7084,57	22795,24	-	-
Total	2351,12	17820,31	57338,45	130457,76	474081,41

Density diesel: 0.85
Density fuel oil: 0.96
Gallon / litres: 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor (tCO_2/TJ)x10^{-3}	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	57338,45	Gg	43	0,0741	3,1863	182697,51
Fuel oil	474081,41	Gg	40,4	0,0774	3,1270	1482433,6
Total						1665131,1

GWh/yr= 2351,12 in 2007

Thus,

$EF_{grid,OMsimple,2007}$ ($tCO2/GWh$)= 708

The operating margin emission factor ($EF_{grid,OM,2007}$) is:
$(EF_{grid,OMsimple,2005}*EG_{,2005}+EF_{grid,OMsimple,2006}*EG_{,2006}+EF_{grid,OMsimple,2007}*EG_{,2007})/(EG_{,2005}+EG_{,2006}+EG_{,2007})$

$=(0,695*2,738x10e^6+0,711*2,828x10e^6+0,708*2,862x10e^6)/(2,739x10e^6+2,828e^6+2,862x10e^6)$

$EF_{grid,OM,2007}$ (tCO_2/MWh)= 0,705

Step 4. Identify the cohort of power units to be included in the buid margin

The sample group of power units *m* used to calculate the build margin consists of either:

- The set of five power units that have been built most recently or
- The set of power capacity additions in the electricity system that comprise 20 % of the system generation (in MWh) and that have been built most recently.

For the proposed project activity the set of five power units that have been built most recently, since this option comprises the larger annual generation. The plants that are registered as CDM that are excluded since the oldest plant not registered under the CDM that is included in the calculation of the build margin emission factor started operation in 1999.

In order to calculate the emission factor for the Build Margin, the same procedure is used as for calculating the emission factor for the Operating Margin. However, since the Build Margin should represent the most probable scenario of power plant additions in the future the calculation considers the most recent 20 % of plants built, or the most recent five plants, whichever that comprises the larger annual generation. In Nicaragua, excluding the CDM projects (Polaris Energy Nicaragua, S.A. PENSA and ATDER-BL (El Bote) the most recent five plants built is the greater number, as these represent 36% of the 2004 annual generation, 37% of the 2005 annual generation, 36% of the 2006 annual generation and 21% of the 2004 annual generation. **The average emission factor for the Build Margin from these five plants was calculated**.

In terms of vintage of data the project participants can choose the two options:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For the proposed project activity, the Option 1 is chosen because it is simpler, not requiring annual updating for this small project.

Step 5. Calculate the build margin emission factor

The buil margin refers to a cohort of power units that reflect the type of power units whose construction would be affested by the proposed CDM project activity.

Thus, the build margin emission factor $\boldsymbol{EF_{grid,BM,y}}$ (tCO_2/MWh).

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

where

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power plant/unit *m* in the year *y* (MWh/year)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in the year *y* (tCO_2/MWh)

m = Power units included in the build margin

The CO_2 emission factor of each power unit *m* that is used in the build margin calculation is determined according to Option B1 proposed by the tool, since data on fuel consumption and electricity generation for each power unit **m** is available.

GRID EMISSION FACTOR FOR 2007. BUILD MARGIN CALCULATION ($EF_{grid,BM,2007}$)

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Empresa Energética de Corinto	550,12	108,63	349,53	32845,77	119361,00
.Tipitapa Power Company	409,24	12,95	41,67	25013,43	90898,40
.Generadora San Rafael S.A.(GESCARSA)	4,50	44,65	143,67	271,05	984,99
.Monte Rosa	112,90	-	-	-	-
.Hugo Chávez (GECSA)	99,81	7084,57	22795,24	-	-
Total	1176,57	7250,8	23330,10	58130,25	211244,40

Density diesel: 0.85
Density fuel oil: 0.96
Gallon / litres: 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO2 Emis. Factor (tCO2/TJ)x10-3	Fuel CO2 Emis. Factor (tCO2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	23330,10	Gg	43	0,0741	3,1863	74336,703
Fuel oil	211244,40	Gg	40,4	0,0774	3,1270	660552,78
					Total	734889,49

GWh/yr= 1,176.57 in 2007

Thus,

$EF_{grid,BMsimple,2007}$ (tCO2/GWh)= 625

$EF_{grid,BM,2007}$= 0,625 (tCO_2/MWh)

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

Data / Parameter:	$NCV_{i,y}$
Data unit:	TJ/mass or volume units
Description:	Net calorific value of fuel *i* in the year *y*
Source of data used:	2006 IPCC default values
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The "Tool to calculate the emission factor for an electricity system" indicates that the values from this source can be applied in the absence of data from the fuel supplier of the power plants or regional/national default values.
Any comment:	Data used to calculate the combined margin emission factor.

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Net quantity of electricity generated and delivered to the grid by power plant/unit *m* in the year *y*
Source of data used:	Nicaraguan Energy Institute (Instituto Nicaragüense de Energía, INE)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the "Tool to calculate the emission factor for an electricity system", the data is obtained from an official source.
Any comment:	Data used to calculate the combined margin emission factor.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fuel *i* in the year *y*
Source of data used:	2006 IPCC default values
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The "Tool to calculate the emission factor for an electricity system" indicates that the values from this source can be applied in the absence of data from the fuel supplier of the power plants or regional/national default values.
Any comment:	Data used to calculate the combined margin emission factor.

B.6.3. Ex-ante calculation of emission reductions:

As mentioned above, emission reductions in year *y* ER_y (tCO_2e/year) results to be:

$ER_y = BE_y = EGy \; X \; EF_{grid,CM,y}$

The combined margin emission factor $EF_{grid,CM,y}$ (tCO_2e/MWh) is determined as follows:

$EF_{grid,CM,y} = w_{OM} \; X \; EF_{grid,OM,y} + w_{BM} \; X \; EF_{grid,BM,y}$

where w_{OM}=50% and w_{BM}= 50%.

As described in Section B.6.1, the grid emission factor is calculated *ex-ante* according to the "Tool to calculate the emission factor for an electricity system", as a combined margin emission factor, consisting of the combination of the operating margin and the build margin factors. The results obtained are the following:

$EF_{grid,OM,y}$ = **0.705 tCO_2/MWh**

$EF_{grid,BM,y}$ = **0.625 tCO_2/MWh**

Thus,

$EF_{grid,CM,y}$ = (0.5 x 0.705 + 0.5 x 0.625) tCO_2/MWh **= 0.665 tCO_2/MWh**

With a total capacity of 940 Kw, the project is expected to generate 5,800 MWh/year. Thus, the emission reductions will be:

Er_y = 5,800 Mwh/year x 0.665 tCO_2/MWh = **3,857 tCO_2/year**

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

Table 8: *Ex-ante* estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2009	0	3857	0	3857
2010	0	3857	0	3857
2011	0	3857	0	3857
2012	0	3857	0	3857
2013	0	3857	0	3857
2014	0	3857	0	3857
2015	0	3857	0	3857
2016	0	3857	0	3857
2017	0	3857	0	3857
2018	0	3857	0	3857
2019	0	3857	0	3857
2020	0	3857	0	3857
2021	0	3857	0	3857
2022	0	3857	0	3857
Total (tonnes CO_2eq)	**0**	**53,998**	**0**	**53,998**

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Annual electricity supplied by the project activity to the grid.
Source of data to be used:	ATDER-BL
Value of data	5,800
Description of measurement methods and procedures to be applied:	The electricity supplied to the grid will be monitored by meters installed in the substation to measure the energy generated. Meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards and international standards (IEC, ISO). The total energy delivered to the grid will also be tracked by the Nicaraguan Energy Institute (INE, the national regulator), which keeps an official record.
QA/QC procedures to be applied:	Production records will be crosschecked with the record of sales to the grid.
Any comment:	

B.7.2 Description of the monitoring plan:

The electricity supplied to the grid will be monitored by special meters installed in the substation to measure the energy generated. There will be an operator responsible for the measurement of the energy generated by the plant. The measurement and recording of energy generated will be double checked by the head plant operator.

The data collected as part of the monitoring plan will be electronically archived and kept for 2 years after the end of the last crediting period. Measurements will be made with calibrated equipment according to accepted standards. See further details in Annex 4: Monitoring Information.

Energy generation of the plant will be cross-checked with the records of sold electricity.

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

Date of completion of the application of the methodology: 6 March 2008.
Jorge Ayala Jimeno
ATDER-BL

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:

01 November 2007.

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

40 years.

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

C.2.1. Renewable crediting period

Renewable crediting period. Two consecutive periods of 7 years each.

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

2010 - As soon as CDM Registration is obtained.

C.2.1.2. Length of the first crediting period:

Seven years.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

C.2.2.2. Length:

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The Ministry of the Environment and Natural Resources (MARENA) is the entity in charge of the conservation, protection, and sustainable use of natural resources and the environment in Nicaragua. It is responsible for the implementation of strategies and programs for municipal development and for the control of polluting activities.

The project's Environmental Impact Assessment ("EIA") is not required by Law because the project has a capacity less than 5 MW. ATDER-BL received a preventives action list from MARENA before dam construction . Water rights was approved by MIFIC (Trade, industry and foment Ministry).

These recommendations were checked by MARENA and found to present no significant impact to the environment.

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:

Environmental impacts of the proposed project activity are not considered significant.

SECTION E. Stakeholders' comments

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

A public assembly was called at which the El Bote hydroelectric project was discussed, with questions, answers and comments from the people. The discussion was transcribed and the participants including representatives of the public health service, the school system, the municipal government, other local institutions, and the public in general, signed the minutes of the meeting. The text which was signed begins with the following statements:

"COMMUNITY MEETING REGARDING THE CLEAN DEVELOPMENT MECHANISM"

Gathered together on April 17, 2008 in the municipality of El Cuá, province of Jinotega, Republic of Nicaragua; representatives of ATDER-BL proceed to explain their intention to obtain Certificates for Carbon Emission Reductions for the project known as "EL BOTE Small Hydroelectric Plant and Rural Electrification Project", such that the sale of these Certificates will help to pay the debt that is owed to the World Bank vía the FNI (Financiera Nicaragüense de Inversiones), and also will help to support efforts to otain economic resources for the conservation of the El Bote watershed, as well as help build more electric lines to extend rural electrification to other villages and families in the area who are requesting electric service.

ATDER-BL explains that international consensus exists regarding the damage that climate change is causing, mainly due to the emission of greenhouse gases. This consensus was manifest with the signing of the Kyoto Protocol and subsequent international agreements.

One of the greenhouse gases is carbon dioxide, for which the chemical formula is CO2. By carrying out the project of the El Bote small hydroelectric plant, the CO_2 formerly emitted by the isolated diesel plant that operated in El Cuá has been stopped. The project has facilitated rural electrification of part of the municipality of El Cua, and the electric lines built have allowed the interconnection of El Cua with Bocay and with the national electric grid. The interconnection with the national grid permits injection of renewable energy from the El Bote hydro plant into the national grid of Nicaragua and hence contributes to reducing the dependence on petroleum.

The Kyoto Protocol establishes obligations and actions that the signing countries must fulfil in order to slow down the emission to the atmosphere of greenhouse gases. The most industrialized countries with the strongest economies, which are the ones that contaminate most, must reduce their emissions of greenhouse gases. The Kyoto Protocol establishes several mechanisms, one of which is the Clean Development Mechanism (CDM) by which a country with a highly developed economy can financially support an initiative in a less developed country that reduces the contamination of the atmosphere by greenhouse gases. The industrialized country provides this support by buying documents with international backing called "Carbon Emission Reduction Certificates", popularly known as "Carbon Credits".

ATDER-BL wishes to obtain these CERs for the El Bote hydro project, because income from sale of the Carbon Credits will contribute to the repayment of the debt incurred in the investment for the construction of the hydroelectric plant in El Bote and the electric grids of the project.

ATDER-BL is therefore proceeding to inform about this proposal, so the public will be informed, so that groups or individuals can freely express their agreement or disagreement with the proposal to obtain "Carbon Credits" for the El Bote hydroelectric project, and to facilitate an exchange of questions and answers as required by the public. It is mentioned that this initiative is a new initiative, the first experience in Nicaragua where a social service project tries to validate and certify Carbon Credits with the official approval of the Office for Clean Development of MARENA (the Nicaraguan Ministry of Natural Resources) also having the support for this effort from the Municipal Government of El Cuá. In this way we want to participate so that Nicaragua will make good use of her renewable energy resources, at the same time extending rural electrification which is so much needed in rural areas like ours, so that finally we will have energy to improve our living conditions and make possible new socio-economic alternatives for the population in the rural areas.

We who sign this document state that electrification is a real need, and we view as positive the support from the Clean Development Mechanism so that our renewable energy sources can supply our energy needs, and at the same time, from the point of view of local organizations and rural communities, we view as positive that the sale to the national grid of the energy generated by El Bote in excess of what we consume, helps us finance, maintain and sustain our projects.

E.2. Summary of the comments received:

Development of the discussion:
Q = question, A = answer, C = comment

Introduction: Personnel of ATDER-BL presented a brief description of the El Bote hydroelectric project, and the present status of the project. The plant has been operating since November 2007. The local electric grids have been extended to bring electricity to other communities of the municipality.

Comments, questions and answers:

Q: FDL (Fondo de Desarrollo Local, a micro-financing organization): ¿What benefits will a person obtain who has forests on his property?
A: In the case of farms located in the watershed of the El Bote hydroelectric plant, ATDER-BL and a local committee have already established a program for sustainable management of the watershed; this program helps and supports farm families located in the watershed with establishing coffee and cacao cultivation, a "loan bank" of bean seed, soil conservation, etc.

Q: Aníbal González (community leader): Has a diagnostic been carried out regarding the amount of CO_2 emission that is avoided in the entire municipality of El Cuá due to the forests that exist here? How can this oxygen contributed by the forests of our area be paid to the owners of the property that have forests?
A: The present discussion is about theCO_2 that is not emitted to the atmosphere because this project is using electricity generated with water power to displace generation by petroleum. The oxygen produced by the large extensions of tropical forests in the municipality of El Cua is a different environmental benefit. ATDER-BL is not aware of any evaluation having been done regarding the forests of this area with respecto to no-emission of CO_2

Q: Could the municipality of El Cua be certified as a no-emitter of carbon dioxide?
A: This is possible, but it would be a different initiative, not the present initiative.

Q: Mrs. Gloria Chavarria (candidate for the Municipal Council): How much does the purchaser pay for the Carbon Credits? What period does the contract cover?
A: The contract may be for a period of approximately 10 years, these details of the contract for sale of the CERs of the El Bote hydroelectric plant have not been negotiated yet.

Q: ¿What will the funds derived from the sale of the CERs be used for after having paid the debt to the bank?
A: Income from sale of CERs will be used for extending the electric grids to the communities of the area that do not yet have electric service, and to broaden the program of sustainable management of the El Bote watershed.

Q: FDL: Why is the El Bote project behind schedule with its loan payments to the bank?
A: There are various factors: one is the delay in start-up of operation of the El Bote hydro plant due to technical problems with the plant equipment. There was a long delay on the parte of INE (Instituto Nicaraguense de Energía, the Regulatory Authority) in aproving the contract by which ATDER-BL sells the excess energy from the El Bote hydro plant to Unión Fenosa (the neighboring distribution company in the national grid). There is a problem, still not resolved, with respect to the prices of purchase and sale of energy between ATDER-BL and Unión Fenosa due to the lack of rules and regulations pertaining to this case in the laws that govern the electricity sector in Nicaragua. Also Unión Fenosa has many defects in their electric lines that block part of the electricity that the El Bote hydro plant could be injecting into the national electric grid. These are some of the factors.

Q: When do you think these problems with Union Fenosa will be resolved?
A: We are working with INE and the Ministry of Energy and Mines on resolving the legal problems related to the contracts for purchase and sale of electricity. The problems of interruptions of the interconnection

between the grid of ATDER-BL and the grid of Union Fenosa is being negotiated with this company. There has been some progress in improving grid intertie continuity during the past four months.

Q: MINSA (Ministry of Health): What will be the benefits to the rural communities?
A: Electric service, extension of the electric grids, and support to the families that live in the El Bote watershed for improvements to their agriculture and soil conservation.

C: Gloria Chavarría: Proposes that the persons or entites that buy the CERs should come and explain personally the price they pay for the CERs, since it seems to her that protecting the environment is worth a higher price.

C: FDL: In the FDL we are promoting a project for the sale of "oxygen". We are negotiating the price for sale of oxygen. The developed countries need more than we do to avoid contamination of the environment. Here there is little contamination compared to the developed countries

C: Anibal Gonzalez: proposes that an initiative for the sale of oxygen should be organized on the national level.

C: Father Francisco Antonio Sandoval (priest of the Catholic Church in El Cua): The forests and rivers, and hence the resources for clean generation of electricity, are patrimony of the municipality of El Cua, and of the entire population here. In this case, regarding the El Bote hydroelectric plant, ATDER-BL represents the population in general of the municipality in the sale of these Carbon Emission Reductions.

Q: Dr.Elsa Marina Venavidez (Town Council Member): Will the sale of the Carbon Emissions Reduction of the El Bote hydroelectric plant prejudice future initiatives for the sale of the "oxygen" of the municipality?
A: No, the CERs of El Bote do not affect any initiative related to the oxygen of the municipality.

We sign this document in representation of the communities, the grass-roots organizations, the municipal government, the Council of Citizen Participation, and members of the public in general:

ORGANIZATION	NAME	SIGNATURE
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: 58 people, all of them residents of the local communities located in the impact area of the project, signed the minutes of this meeting.

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

No negative comments nor complaints regarding environmental nor social impacts of the project were expressed by any of the local stakeholders, hence no corrective measures are considered to be required.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Asociación de Trabajadores de Desarrollo Rural - Benjamín Linder (ATDER-BL)
Street/P.O.Box:	Del Hotel Bermúdez, 75 varas al Sur.
Building:	
City:	Matagalpa
State/Region:	Matagalpa
Postfix/ZIP:	
Country:	Nicaragua
Telephone:	(505) 772 2030
FAX:	(505) 772 5423
E-Mail:	atder@ibw.com.ni, posicle2002@yahoo.es
URL:	
Represented by:	Rebeca Leaf
Title:	Director
Salutation:	Mrs,
Last Name:	Leaf
Middle Name:	Louis
First Name:	Rebecca
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from an Annex I party for this project.

Funding	**Name of Financier**	**Amount US$**	**Status**
Existing Cash Flow			
Equity	Private and ATDER-BL funds	$ 510,844	have
Bank Loan	World Bank Program (PERZA), administered by FNI (Financiera Nicaragüense de Inversiones)	$ 1,301,465.00	received
Other	Beneficiaries Communities	$ 77,484	received
Total	(approx)	**$ 1,889,793**	

FUNDS ORIGIN CERTIFICATES (No Official Development Aid) from MEM and IDR in the next pages.

Gobierno de Reconciliación y Unidad Nacional

El Pueblo, Presidente!

Certificación de Origen de Fondos

A Quien Corresponda:

Por este medio la suscrita Directora del Programa PERZA (Proyecto de Electrificación Rural en Zonas Aisladas) del Ministerio de Energía y Minas de la República de Nicaragua hace constar que nuestro Programa ha concedido los siguientes tipos y cuantías de financiamiento al proyecto "Mini-Central Hidroeléctrica y Electrificación Rural – El Bote" ejecutado por la Asociación de Trabajadores de Desarrollo Rural – Benjamín Linder (ATDER-BL):

Monto		Fecha	Calidad	Origen o Partida de los fondos
1	US$ 500,000	27 Nov 2003	Subsidio	Convenio AIF – 3760 - NI
2	$ 40,000	27 Nov 2003	Asistencia Técnica	Convenio GEF – TF051960
3	$ 1,210,000	25 Ene 2005	Préstamo	Convenio AIF – 3760 - NI
4	$ 91,465	24 Oct 2006	Préstamo (ampliación)	Convenio AIF – 3760 - NI

Aclaramos que los fondos del Convenio AIF–3760–NI provienen del Banco Mundial, con una contraparte aportada del presupuesto anual de la Republica de Nicaragua. Dichos fondos fueron canalizados al proyecto en mención, por el Ministerio de Energía y Minas a través del programa PERZA (Proyecto de Electrificación Rural en Zonas Aisladas), cuyo objetivo principal es ampliar la cobertura de la electrificación en las zonas rurales de Nicaragua que carecen de este servicio básico, tan importante para el desarrollo económico y social.

Certificamos que el financiamiento aportado por esta Institución a dicho proyecto no constituyó, en ningún caso, una desviación de la Ayuda Oficial al Desarrollo.

Extiendo la presente en la ciudad de Managua a los 16 días del mes de Mayo del año 2008.

Lic. Francis Dávila
Coordinador
Proyecto P.E.R.Z.A.
Ministerio de Energía y Minas

PODER CIUDADANO
Nicaragua Gana con Vos!

MINISTERIO DE ENERGIA Y MINAS
Del Portón del Hospital Bautista 1 c. Abajo, 125 vrs. al lago. Apartado postal CJ-159.
Managua, Nicaragua
PBX: (505) 222-5576 Fax: (505) 222-4629

Gobierno de Reconciliación
y Unidad Nacional
El Pueblo, Presidente!

NICARAGUA TRIUNFA

INSTITUTO DE DESARROLLO RURAL
DELEGACIÓN TERRITORIAL JINOTEGA

Certificación de Origen de Fondos

A Quien Corresponda:

Por este medio el suscrito **Gerente de Proyectos de Infraestructura** del **IDR de Jinotega** (**Instituto de Desarrollo Rural**) hace constar que nuestra institución en el año 2000 realizó la rehabilitación de un camino rural en la zona de El Bote, en el municipio de El Cuá, Departamento de Jinotega, lo cual, además de beneficiar a la comunidad rural de La Samaria con este mejoramiento de un camino secundario para sacar su producción agrícola, a la vez sirve como camino de acceso a la Casa de Máquinas de la planta hidroeléctrica de El Bote, construida por la *Asociación de Trabajadores de Desarrollo Rural – Benjamín Linder* (***ATDER-BL***).

Este proyecto de camino rural se denominaba "Rehabilitación del Camino Rural La Samaria 3.00 km". Para su ejecución, el IDR aportó un monto de US $ 56,331.21 de fondos provenientes del Programa de Reactivación Productiva Agroalimentaria (PRPA) Contrato BID No. 1001 SF-NI. Los fondos del IDR fueron facilitados a la ATDER-BL a través del convenio No. 029-II-2000 pagados directamente, conforme contrato firmado, a la empresa constructora de caminos ADEL-Jinotega. La comunidad beneficiaria aportó US $ 2,984 en especie (mano de obra y balastre), y la ONG **ATDER-BL** aportó US $ 2,984 en especie (materiales para la instalación de alcantarillas en este mismo camino).

La rehabilitación del camino en mención obedece a uno de los objetivos principales del IDR, la reparación de caminos rurales en las zonas productivas del país para facilitar la sacada de las cosechas agrícolas, favoreciendo de esta manera el mejoramiento de la economía local.

Certificamos que el financiamiento asignado por nuestra institución a dicho proyecto no constituyó una desviación de la Ayuda Oficial al Desarrollo.

Extiendo la presente en la ciudad de Jinotega a los quince días del mes de Mayo del año 2008.

Ing. Walter Castro Zeledón
Gerente de Proyectos de Infraestructura
IDR – Instituto de Desarrollo Rural – Jinotega

Archivo

Gobierno de Reconciliación y Unidad Nacional
El Pueblo, Presidente!
ADMINISTRACIÓN
IDR - Jinotega
Instituto de Desarrollo Rural

PROGRAMA DE REACTIVACIÒN PRODUCTIVA RURAL(PRPR-IDR) AGENCIA JINOTEGA
TEL:.(505) 782-3164 Fax. 782-4540
Km. 165 Carretera a San Rafael del Norte
prprjinotega@yahoo.com

Annex 3

BASELINE INFORMATION

Grid Emission & Emission Factor for 2005

OPERATING MARGIN CALCULATION

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	419.68	-		33536.96	121872.78
.Managua (GECSA)	179.17	-		15311.28	55640.95
.Censa Amsfels	319.61	-		20002.95	72690.40
.Empresa Energética de Corinto	523.87	66.76	214.81	31348.35	113919.40
.Tipitapa Power Company	399.83	-		24472.21	88931.62
.Generadora San Rafael S.A.(GESCARSA)	0.00	-		0	0.00
.Nic. Sugar Estate Ltd. (NSEL)	113.60	-		0	0.00
.Monte Rosa	89.83	-		-	
.Chinandega (GEOSA)	0.49	68.82	221.43	-	
.Las Brisas (GECSA)	24.85	2000.85	6437.91	-	
.Hugo Chávez (GECSA)	0.00	-		-	
Total	2070.93	2136.43	6874.16	124671.75	453055.145

Density diesel 0.85
Density fuel oil 0.96
gallon:litres 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor $(tCO_2/TJ)x10^{-3}$	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	6874.16	Gg	43	0.0741	3.1863	21903.12264
Fuel oil	453055.14	Gg	40.4	0.0774	3.1270	1416685.315
Total						1438588.438
					GWh/yr	2070.93

$EF_{grid,OMsimple,2005}$ (tCO2/GWh)= 695

Grid Emission & Emission Factor for 2006

OPERATING MARGIN CALCULATION

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	546.15	-		43240.21	157134.23
.Managua (GECSA)	180.02	-		16283.07	59172.42
.Censa Amsfels	314.24	-		19381.3	70431.33
.Empresa Energética de Corinto	528.40	101.78	327.49	31744.26	115358.13
.Tipitapa Power Company	420.18	-		25597.28	93020.11
.Generadora San Rafael S.A.(GESCARSA)	0.00	-		0	0.00
.Nic. Sugar Estate Ltd. (NSEL)	100.42	-		27.01	98.15
.Monte Rosa	93.93	-		-	
.Chinandega (GEOSA)	0.82	111.48	358.70	-	
.Las Brisas (GECSA)	68.31	4909.66	15797.27	-	
.Hugo Chávez (GECSA)	0.00	-		-	
Total	2252.47	5122.92	16483.46	136273.13	495214.374

Density diesel 0.86
Density fuel oil 0.95
gallon:litres 3.7854

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor $(tCO_2/TJ)x10^{-3}$	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	16483.46	Gg	43	0.0741	3.1863	52521.23637
Fuel oil	495214.37	Gg	40.4	0.0774	3.1270	1548515.539
Total						1601036.775
					GWh/yr	2252.47

$EF_{grid,OMsimple,2006}$ (tCO2/GWh)= 711

Grid Emission & Emission Factor for 2007

OPERATING MARGIN CALCULATION

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Nicaragua (GEOSA)	515.98	-		40967.7	148875.97
.Managua (GECSA)	211.42	-		17522.8	63677.57
.Censa Amsfels	217.65	-		13837.01	50283.47
.Empresa Energética de Corinto	550.12	108.63	349.53	32845.77	119361.00
.Tipitapa Power Company	409.24	12.95	41.67	25013.43	90898.40
.Generadora San Rafael S.A.(GESCARSA)	4.50	44.65	143.67	271.05	984.99
.Nic. Sugar Estate Ltd. (NSEL)	122.38	-		0	0.00
.Monte Rosa	112.90	-		-	
.Chinandega (GEOSA)	0.00	1.12	3.60	-	
.Las Brisas (GECSA)	107.12	10568.39	34004.75	-	
.Hugo Chávez (GECSA)	99.81	7084.57	22795.24	-	
Total	2351.12	17820.31	57338.45	130457.76	474081.413

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO_2 Emis. Factor $(tCO_2/TJ)x10^{-3}$	Fuel CO_2 Emis. Factor (tCO_2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	57338.45	Gg	43	0.0741	3.1863	182697.5072
Fuel oil	474081.41	Gg	40.4	0.0774	3.1270	1482433.614
Total						1665131.121
					GWh/yr	2351.12

$EF_{grid,OMsimple,2007}$ (tCO_2/GWh)= 708

Density diesel 0.86
Density fuel oil 0.95
gallon:litres 3.7854

$$EF_{grid,OM,2007} = (EF_{grid,OMsimple,2005} * EG_{,2005} + EF_{grid,OMsimple,2006} * EG_{,2006} + EF_{grid,OMsimple,2007} * EG_{,2007}) / (EG_{,2005} + EG_{,2006} + EG_{,2007})$$

$$EF_{grid,OM,2007} = (0{,}695*2{,}74 + 0{,}711*2{,}83 + 0{,}708*2{,}86) / (2{,}74 + 2{,}83 + 2{,}86)$$

$EF_{grid,OM,2007}$ (tCO_2/MWh)= 0.705

Grid Emission & Emission Factor for 2007

BUILD MARGIN CALCULATION

Power Plant	Net generation (GWh/yr)	Diesel x 10^3 gal/yr	Diesel Gg/yr	Fuel oil x 10^3 gal/yr	Fuel oil Gg/yr
.Empresa Energética de Corinto	550.12	108.63	349.53	32845.77	119361.00
.Tipitapa Power Company	409.24	12.95	41.67	25013.43	90898.40
.Generadora San Rafael S.A.(GESCARSA)	4.50	44.65	143.67	271.05	984.99
.Monte Rosa	112.90	-		-	
.Hugo Chávez (GECSA)	99.81	7084.57	22795.24	-	
Total	1176.57	7250.8	23330.10	58130.25	211244.40

Fuel type	Fuel consumption	Units	Heat content (TJ/Gg) IPCC 2006 table 1.2	Fuel CO2 Emis. Factor (tCO2/TJ)x10-3	Fuel CO2 Emis. Factor (tCO2/Gg)	CO_2 Emissions (tCO_2/yr)
Diesel	23330.10	Gg	43	0.0741	3.1863	74336.70264
Fuel oil	211244.40	Gg	40.4	0.0774	3.1270	660552.7841
Total						734889.4867
					GWh/yr	1176.57

$EF_{grid,BM,2007}$= 0.625 (tCO_2/MWh)

$EF_{grid,BMsimple,2007}$ (tCO_2/GWh)= 625

Thus:

$$EF_{grid,CM,2007} = 0{,}5 \times EF_{grid,OM,2007} + 0{,}5 \times EF_{grid,BM,2007}$$

$EF_{grid,CM,2007}$= 0.665 (tCO_2/MWh)

Estadísticas del Sector Eléctrico

GENERACION NETA POR TIPO DE PLANTA
(GWH)

DESCRIPCION	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Plantas Térmicas	**543.61**	**735.47**	**659.31**	**723.24**	**842.82**	**1,029.30**	**1,027.68**	**1,274.16**	**1,370.30**	**1,713.10**	**1,878.15**	**1,926.57**	**2,008.09**	**2,082.79**	**2,045.59**	**2,183.35**	**2,144.19**
. Nicaragua (GEOSA)	321.19	477.25	482.05	666.76	636.64	680.73	583.64	672.18	552.00	468.15	452.44	571.25	487.11	505.28	419.68	546.15	515.98
. Managua (GECSA)	222.42	258.22	177.27	56.47	206.19	334.73	312.44	357.58	222.17	212.54	241.92	183.05	183.87	216.88	179.17	180.02	211.42
. Censa - AMFELS							117.71	208.29	161.89	138.46	242.60	189.91	289.17	318.51	319.61	314.24	217.65
. Empresa Energética de Corinto									123.06	477.90	497.47	485.14	505.95	499.59	523.87	528.40	550.12
. Tipitapa Power Company									278.16	382.60	410.21	401.44	407.89	409.06	399.83	420.18	409.24
.Generadora San Rafael, S.A. (Gesarsa)														5.55	0.00	0.00	4.50
. Nic.Sugar Estate Ltd. (NSEL)								23.69	25.05	27.19	32.55	72.99	97.36	84.19	113.60	100.42	122.38
. Monte Rosa												22.80	36.74	43.73	89.83	93.93	112.90
. Agroindustrial Azucarera S.A. (Timal)						13.85	13.89	12.42	7.98	6.25	0.96						
Plantas Hidroeléctricas	**335.63**	**255.98**	**481.56**	**375.29**	**398.58**	**423.99**	**397.94**	**288.66**	**385.53**	**204.13**	**189.50**	**296.05**	**291.76**	**311.41**	**426.25**	**299.25**	**300.56**
. Centroamérica (HIDROGESA)	198.56	154.30	272.12	218.38	208.59	236.40	233.67	171.27	253.15	120.68	123.46	180.20	171.31	194.59	230.25	184.88	168.17
. Santa Bárbara (HIDROGESA)	133.92	97.93	202.93	151.30	181.17	179.51	155.56	111.90	128.96	81.16	65.95	115.85	120.45	116.82	196.00	114.37	131.41
. Wabule	1.50	2.08	2.65	2.99	3.61	0.94	3.02	2.78	-	-	-	-	-				
. Las Canoas	1.64	1.66	3.88	2.63	5.20	7.14	5.69	2.71	3.42	2.29	0.09	-	-				
. Atder - BL El Bote																	0.97
Plantas Turbinas a Gas	**0.67**	**0.46**	**18.89**	**115.06**	**88.22**	**23.31**	**90.66**	**296.36**	**138.79**	**57.55**	**44.91**	**11.11**	**18.86**	**26.00**	**25.34**	**69.13**	**206.94**
. Chinandega (GEOSA)	0.67	0.12	-	5.59	22.55	2.13	17.18	38.73	18.64	3.75	2.50	0.18	0.72	0.70	0.49	0.82	0.00
. Las Brisas (GECSA)	-	0.35	18.89	109.47	65.66	21.18	73.48	257.63	120.15	53.80	42.41	10.94	18.14	25.29	24.85	68.31	107.12
. Hugo Chavez (GECSA) - Motores Combustión Int.																	99.81
Plantas Geotérmicas	**427.66**	**435.10**	**376.62**	**327.84**	**280.75**	**243.27**	**187.37**	**107.13**	**90.39**	**120.75**	**187.56**	**191.22**	**242.40**	**227.16**	**241.21**	**276.98**	**211.06**
. Ormat Momotombo Power Company a/	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	223.17	225.58	146.45
. Polaris Energy Nicaragua, S.A. (Pensa)															18.05	51.39	64.62
Sistema Interconectado Nacional (SIN)	**1,307.57**	**1,427.01**	**1,536.39**	**1,541.43**	**1,610.38**	**1,719.87**	**1,703.66**	**1,966.30**	**1,985.02**	**2,095.53**	**2,300.11**	**2,424.96**	**2,561.11**	**2,647.35**	**2,738.39**	**2,828.71**	**2,862.75**
Sistemas Aislados (Diesel Oil)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	17.34	12.58	13.63	16.80	18.50	21.92
Sistemas Aislados (Fuel Oil)												10.90	17.33	18.42	19.70	22.09	19.87
Sistemas Aislados (Hidro)												0.30	0.42	0.40	0.37	0.31	0.06
Sistemas Aislados	**16.63**	**19.56**	**22.02**	**23.00**	**20.80**	**13.15**	**13.88**	**16.92**	**21.13**	**21.07**	**28.49**	**28.53**	**30.34**	**32.45**	**36.87**	**40.90**	**41.86**
TOTAL (S.I.N. +Aislados)	**1,324.20**	**1,446.57**	**1,558.42**	**1,564.43**	**1,631.18**	**1,733.02**	**1,717.54**	**1,983.23**	**2,006.15**	**2,116.60**	**2,328.61**	**2,453.49**	**2,591.44**	**2,679.81**	**2,775.26**	**2,869.61**	**2,904.60**

a/ A partir del mes de Julio de 1999 dada en arrendamiento a la empresa Ormat International Inc.
S.I.N. – Plantas Térmicas + Hidroeléctricas + Turbinas a Gas + Geotérmica.

Instituto Nicaragüense de Energía
Ente Regulador

Estadísticas del Sector Eléctrico

GENERACION NETA POR TIPO DE COMBUSTIBLE (GWH)

DESCRIPCION	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
S.I.N.	**1,307.57**	**1,427.01**	**1,536.39**	**1,541.43**	**1,610.38**	**1,719.87**	**1,703.66**	**1,966.30**	**1,985.02**	**2,095.53**	**2,300.11**	**2,424.96**	**2,561.11**	**2,647.35**	**2,738.39**	**2,828.71**	**2,862.75**
Térmicas (Fuel Oil)	543.61	735.47	659.31	723.24	842.82	1,015.45	1,013.79	1,238.05	1,337.27	1,679.65	1,844.65	1,830.78	1,873.99	1,954.87	1,842.16	1,989.00	1,908.90
Térmicas (Diesel)	0.67	0.46	18.89	115.06	88.22	23.31	90.66	296.36	138.79	57.55	44.91	11.11	18.86	26.00	25.34	69.13	206.94
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.05	291.76	311.41	426.25	299.25	300.56
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
SISTEMAS AISLADOS	**16.63**	**19.56**	**22.02**	**23.00**	**20.80**	**13.15**	**13.88**	**16.92**	**21.13**	**21.07**	**28.49**	**28.53**	**30.34**	**32.45**	**36.87**	**40.90**	**41.86**
Térmicas (Fuel Oil)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.90	17.33	18.42	19.70	22.09	19.87
Térmicas (Diesel)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	17.34	12.58	13.63	16.80	18.50	21.92
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.42	0.40	0.37	0.31	0.06
NACIONAL	**1,324.20**	**1,446.57**	**1,558.42**	**1,564.43**	**1,631.18**	**1,733.02**	**1,717.54**	**1,983.23**	**2,006.15**	**2,116.60**	**2,328.61**	**2,453.49**	**2,591.44**	**2,679.81**	**2,775.26**	**2,869.61**	**2,904.60**

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.05	291.76	311.41	426.25	299.25	300.56
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
Termoeléctricas (Fuel Oil + Diesel)	544.28	735.93	678.21	838.29	931.04	1,038.77	1,104.45	1,534.41	1,476.07	1,737.20	1,889.55	1,841.89	1,892.85	1,980.86	1,867.50	2,058.12	2,115.84
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
TOTAL S.I.N.	**1,307.57**	**1,427.01**	**1,536.39**	**1,541.43**	**1,610.38**	**1,719.87**	**1,703.66**	**1,966.30**	**1,985.02**	**2,095.53**	**2,300.11**	**2,424.96**	**2,561.11**	**2,647.35**	**2,738.39**	**2,828.71**	**2,862.75**
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.42	0.40	0.37	0.31	0.06
Termoeléctricas (Fuel Oil + Diesel)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	28.24	29.92	32.05	36.49	40.59	41.79
TOTAL AISLADOS	**16.63**	**19.56**	**22.02**	**23.00**	**20.80**	**13.15**	**13.88**	**16.92**	**21.13**	**21.07**	**28.49**	**28.53**	**30.34**	**32.45**	**36.87**	**40.90**	**41.86**
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.34	292.18	311.82	426.62	299.57	300.62
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
Termoeléctricas (Fuel Oil + Diesel)	560.92	755.48	700.23	861.29	951.84	1,051.91	1,118.33	1,551.33	1,497.20	1,758.27	1,918.05	1,870.13	1,922.76	2,012.91	1,904.00	2,098.71	2,157.63
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
TOTAL NACIONAL	**1,324.20**	**1,446.57**	**1,558.42**	**1,564.43**	**1,631.18**	**1,733.02**	**1,717.54**	**1,983.23**	**2,006.15**	**2,116.60**	**2,328.61**	**2,453.49**	**2,591.44**	**2,679.81**	**2,775.26**	**2,869.61**	**2,904.60**

Dpto. de Estadísticas , DEEyE - INE

Instituto Nicaragüense de Energía
Ente Regulador

Estadísticas del Sector Eléctrico

CONSUMO DE COMBUSTIBLE POR TIPO DE PLANTA
SISTEMA INTERCONECTADO NACIONAL Y SISTEMAS AISLADOS

PLANTAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Térmicas (Fuel Oil - 10^3Gls)	47,585.10	62,707.53	57,124.69	56,674.33	68,582.00	82,190.91	79,614.71	98,197.65	99,642.09	116,049.43	127,558.11	128,004.93	128,480.58	133,464.66	124,671.75	136,273.13	130,457.76
. Nicaragua (GEOSA)	25,956.80	37,459.85	38,478.94	50,676.29	50,508.00	53,983.19	46,564.71	52,737.58	43,817.31	37,616.49	36,752.84	46,280.85	39,498.28	40,256.17	33,536.96	43,240.21	40,967.70
. Nicaragua (Calentamiento)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.57	26.86	0.00	0.00	0.00	0.00	0.00	0.00
. Managua (GECSA)	21,628.30	25,247.68	18,645.76	5,998.05	18,074.00	28,207.72	25,672.84	28,054.96	17,561.86	17,135.95	20,388.82	15,979.15	15,747.86	18,482.38	15,311.28	16,283.07	17,522.80
. Managua (Calentamiento)										3.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
. Censa - AMFELS							7,377.17	13,917.78	10,827.60	9,143.99	15,696.52	12,058.15	18,148.19	19,795.32	20,002.95	19,381.30	13,837.01
. Empresa Energética de Corinto									7,394.59	28,768.58	29,766.59	29,219.09	30,281.49	29,849.61	31,348.35	31,744.26	32,845.77
. Tipitapa Power Company									16,922.91	23,209.44	24,915.74	24,394.97	24,672.47	24,640.70	24,472.21	25,597.28	25,013.43
. Generadora San Rafael, S.A. (Gesarsa)														440.47			271.05
. Nic.Sugar Estate Ltd. (NSEL)								3,487.32	3,117.83	138.42	7.65	72.71	132.29	0.00	0.00	27.01	0.00
Térmicas + Turbinas a Gas (Diesel - 10^3Gls)						22.74	40.99	15.65	76.58	67.85	80.31	132.53	320.52	93.98	68.31	102.58	122.70
. Managua (Geración + Calentamiento)						22.74	40.99	15.65	13.38	3.04	2.76	1.07	0.24	0.00	0.00	0.00	0.00
. Empresa Energética Corinto (Calentamiento)									63.20	62.45	73.53	128.48	316.93	93.98	66.76	101.78	108.63
. Tipitapa Power Company																	12.95
. Las Brisas (Calentamiento)										0.42	2.15	0.69	3.36	0.00	0.00	0.00	0.00
. Chinandega (Calentamiento)										1.94	1.86	2.29	0.00	0.00	1.55	0.80	1.12
Térmicas (10^3 Ton. Bagazo de Caña)						179.29	178.59	171.76	161.66	350.09	147.36	432.08	531.67	924.92	1,010.79	950.94	1,103.37
. Nic.Sugar Estate Ltd. (NSEL)									47.65	176.64	147.36	174.93	269.12	494.36	585.44	563.41	640.29
. Monte Rosa												257.15	262.55	430.56	425.35	387.53	463.08
. Agroindustrial Azucarera S.A. (Timal)						179.29	178.59	171.76	114.00	173.45							
Térmicas (Toneladas Métricas de)																	
. Nic.Sugar Estate Ltd. (NSEL) - Leña										7,768.62	0.00	27,824.00	21,489.00	50,670.40	25,972.84	26,746.42	29,334.24
. Monte Rosa, S.A. - Leña												832.71	360.90	1,071.43	203.04	300.74	0.00
. Nic.Sugar Estate Ltd. (ISA) - Casc.Arroz										6,913.00	0.00	0.00	6,333.00	0.00	0.00	0.00	0.00
Hidroeléctricas (10^6m^3 de Agua)	645.41	499.75	939.21	739.69	835.77	808.72	851.01	597.65	783.90	429.81	350.90	552.38	544.46	582.11	801.60	558.93	578.36
. Centroamérica (HIDROGESA)	330.40	257.15	443.33	373.08	360.19	402.25	402.14	294.70	432.00	208.31	212.28	310.48	292.86	337.95	392.29	319.77	299.41
. Santa Bárbara (HIDROGESA)	279.66	204.66	423.57	316.07	378.29	374.78	324.88	233.91	269.39	169.97	138.62	241.90	251.60	244.16	409.31	239.16	274.70
. Wabule	5.20	7.05	8.92	10.10	12.20	31.70	123.99	7.37	0.00	0.00							
. Las Canoas	30.14	30.88	63.40	40.45	85.09			61.66	82.50	51.53							
. Atder - BL El Bote																	4.25
Turbinas a Gas + Térmicas (Diesel Oil - 10^3Gls)	87.40	51.59	1,852.70	10,988.73	8,968.10	2,420.62	9,107.10	25,414.79	11,328.08	4,929.67	3,982.99	972.33	1,760.50	2,175.64	2,068.12	5,020.33	17,697.62
. Chinandega (GEOSA)	87.40	16.01	0.00	691.77	2,695.80	260.96	1,973.79	4,475.12	2,130.18	438.76	334.96	33.37	97.69	97.08	67.27	110.68	0.00
. Las Brisas (GECSA)		35.58	1,852.70	10,296.96	6,272.30	2,159.66	7,133.32	20,939.67	9,197.90	4,490.91	3,648.03	938.97	1,662.80	2,078.56	2,000.85	4,909.66	10,568.39
. Hugo Chavez (GECSA) - Motores Combustión Int.																	7,084.57
. Generadora San Rafael, S.A. (Gesarsa)														92.38			44.65
Geotérmicas (10^3Ton/Vapor)	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,990.78	2,532.61	2,055.39
. Ormat Momotombo Power Company a/	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,699.73	1,730.53	1,069.42
. Polaris Energy Nicaragua, S.A. (Pensa)															291.05	802.08	985.97
. Ormat Energy Converters (OEC) - MMC Agua Caliente													9,532.62	8,724.48	9,146.49	9,239.55	7,713.66
Sistemas Aislados (Diesel Oil - 10^3Gls)	1,346.34	1,601.35	1,874.94	1,966.98	1,772.38	1,138.61	1,215.47	1,380.67	1,841.91	1,872.91	1,964.49	1,531.13	1,130.34	1,171.31	2,090.34	1,784.66	2,028.64
Sistemas Aislados (Fuel Oil - 10^3Gls)												782.81	1,266.46	1,381.36	961.31	1,456.43	1,391.74
Sistemas Aislados (Agua - 10^3m^3)												1,389.90	1,380.87	1,465.10	1,515.76	1,304.24	282.25
RESUMEN																	
Total Fuel Oil (10^3 Gls)	47,585.10	62,707.53	57,124.69	56,674.33	68,582.00	82,190.91	79,614.71	98,197.65	99,642.09	116,049.43	127,558.11	128,787.73	129,747.05	134,846.02	125,633.06	137,729.56	131,849.50
Total Diesel (10^3 Gls)	1,433.74	1,652.94	3,727.64	12,955.71	10,740.48	3,581.97	10,363.56	26,811.10	13,246.58	6,870.43	6,027.78	2,635.99	3,211.36	3,440.93	4,226.77	6,907.57	19,848.96
Total Vapor Geotérmico (10^3Ton/Vapor)	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,990.78	2,532.61	2,055.39
Total Agua (10^6m^3)	645.41	499.75	939.21	739.69	835.77	808.72	851.01	597.65	783.90	429.81	350.90	553.77	545.84	583.58	803.12	560.23	578.65
Total Agua Caliente (Salmuera) 10^3 M^3													9,532.62	8,724.48	9,146.49	9,239.55	7,713.66
Total Leña (Toneladas)										7,768.62	0.00	28,656.71	21,849.90	51,741.83	26,175.88	27,047.16	29,334.24
Total Cascarilla Arroz (Toneladas)										6,913.00	0.00	0.00	6,333.00	0.00	0.00	0.00	0.00
Total Bagazo de Caña (10^3 Toneladas)						179.29	178.59	171.76	161.66	350.09	147.36	432.08	531.67	924.92	1,010.79	950.94	1,103.37
Total Fuel Oil (10^3 Barriles)	1,132.98	1,493.04	1,360.11	1,349.39	1,632.90	1,956.93	1,895.59	2,338.04	2,372.43	2,763.08	3,037.10	3,066.37	3,089.22	3,210.62	2,991.26	3,279.28	3,139.27
Total Diesel (10^3 Barriles)	34.14	39.36	88.75	308.47	255.73	85.29	246.75	638.36	315.39	163.58	143.52	62.76	76.46	81.93	100.64	164.47	472.59

MMC = Miles de Metros Cúbicos.
Dpto. de Estadísticas , DEEyE - INE

Instituto Nicaragüense de Energía
Ente Regulador

INSTITUTO NICARAGÜENSE DE ENERGÍA
INE
Ente Regulador

Managua, 21 de Julio de 2008

Sra Aleyda Morales Quintero
Vice-Presidente
Asociación de Trabajadores de Desarrollo Rural – Benjamín Linder
ATDER-BL

Estimada Señora Morales:

En atención a su solicitud formulada en carta con fecha 3 del corriente mes, relacionada a los datos de generación y consumo de combustibles correspondientes a los años del 2003 al 2007, por este medio me permito remitir a usted la información solicitada.

La información, se encuentra en los anexos adjuntos a esta carta y corresponde al siguiente detalle:

- Empresas generadoras incluyendo tipo de combustible y año de inicio de operación.
- Generación bruta en GWh por tipo de planta, combustible utilizado y Sistema 1991 – 2007
- Generación neta en GWh por tipo de planta, combustible utilizado y Sistema 1991 – 2007
- Consumo de combustible por tipo de planta y Sistema 1991 – 2007.

En espera que la información remitida, le sea de utilidad en la gestión de los Créditos de Carbono para la planta Hidroeléctrica de El Bote, le saludo.

Atentamente,

Lic. Miguel Alemán A.
Director de Estudios Económicos y Estadísticas
INE.

Cc: Ing. José David Castillo Presidente del Consejo de Dirección del INE
Archivo

DETALLE DE LAS EMPRESAS GENERADORAS

EMPRESAS ELECTRICAS	Tipo de Combustión	Inicio Operaciones
SISTEMA INTERCONECTADO NACIONAL		
PUBLICAS		
Generadora Hidroeléctrica, S.A. (HIDROGESA)		
. Centroamérica (HIDROGESA)		
CA U1		1964
CA U2		1965
. Santa Bárbara (HIDROGESA)		
SB U1		1971
SB U2		1972
Generadora Eléctrica Central, S.A. (GECSA)		
. Managua (GECSA)		
Mg U3	Térmica a Vapor, Arranque en Frio Diesel, Arranque en Caliente Bunker	1971
Mg U4	Combustión Interna, Arranque con Bunker, Arranque con Diesel	1994
Mg U5		1997
. Las Brisas (GECSA)		
LB U1	Turbina a Gas	1992
LB U2		1998
. Hugo Chavez (GECSA)		
HC-U1		
HC-U2	Motores de Combustión Interna a base de Diesel	2007
HC-U3		
HC-U4		
Generadora San Rafael, S.A. (GESARSA)		
GESR-U#1	Todas las unidades se arrancan y se apagan con Diesel y operan con Bunker, son de combustion interna.	Inicia Operaciones el 01 Enero de 2004 y cierra el 04 de Junio 2006. Reinicia Operaciones el 13 Octubre de 2007.
GESR-U#2		
GESR-U#3		
GESR-U#4		
PRIVADAS		
Corporación Eléctrica Nicaragüense, S.A. (CENSA)		
Cat-No.1		
Cat-No.2		
Cat-No.3		
Cat-No.4		
Cat-No.5		I Etapa entra a generar a partir del 23 de Julio de 1997.
Cat-No.6	Todas las unidades se arrancan con Diesel y operan con Bunker y son de combustion interna.	
Cat-No.7		
Cat-No.8		
Cat-No.9		
Mak-No.1		
Mak-No.2		II etapa en el año 2000.
Mak-No.3		
Mak-No.4		
Empresa Energética Corinto, Ltd. (ENRON)		
EEC-U#1	Todas las unidades se arrancan y operan con Bunker y son de combustion interna.	Entra a generar a partir de Septiembre de 1999.
EEC-U#2		
EEC-U#3		
EEC-U#4		
Planta Geotérmica Momotombo	Geotérmica	A partir del mes de Julio de 1999 dada en arendamiento a la empresa Ormat International Inc.
OMPC-U#1		Puesta en operación en Agosto de1983
OMPC-U#2		Puesta en operación en Marzo de1989
OMPC-U#3 - Agua Caliente de Salmuera		Puesta en operación en 28 de Noviembre del 2002.
Tipitapa Power Company		
TPC-U#1		
TPC-U#2	Todas las unidades se arrancan y operan con Bunker y/o Diesel y son de combustion interna.	Entra a generar a partir del 14 de Abril de 1999.
TPC-U#3		
TPC-U#4		
TPC-U#5		
Generadora Eléctrica de Occidente, S.A. (GEOSA)		A partir del 20 de Abril del año 2002
. Nicaragua (GEOSA)		
NI-U#1	Termica a Vapor, consume Bunker.	1976
NI-U#2		1977
. Chinandega (GEOSA)	Turbina a Gas	1967
Nicaraga Sugar Estates Limited (NSEL)		Entra a generar a partir del 19 de Junio de 1998.
NSEL-U#1	Termica a Vapor, consume Bagazo de Caña y en ocaciones Leña	1998
NSEL-U#2		2002
NSEL-U#3		2003
Monte Rosa, S.A. (IMR)		Entra a generar a partir del 16 de Octubre del 2001.
IMR-U#1		Diciembre de 2004
IMR-U#3	Termica a Vapor, consume Bagazo de Caña y en ocaciones Leña	1998
IMR-U#5		Noviembre de 2002
IMR-U#6		Noviembre de 2002
IMR-U#7		Diciembre de 2004
IMR-U#8		Diciembre de 2005
Polaris Energy Nicaragua, S.A. (PENSA)	Geotérmica	La operación de la planta comenzó el 11 de Junio del 2005 pero este fue un periodo de pruebas
PENSA U1		
PENSA U2		

Fuente: Dirección de Estudios Económicos y Estadísticas - INE

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Estadísticas del Sector Eléctrico

GENERACION BRUTA POR TIPO DE PLANTA
(GWH)

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Plantas Térmicas	581.53	782.52	704.34	761.07	900.82	1,119.90	1,114.99	1,376.74	1,462.74	1,837.75	1,990.88	2,064.25	2,151.08	2,284.39	2,282.42	2,404.29	2,380.02
. Nicaragua (GEOSA)	338.15	499.37	507.19	699.30	680.44	729.01	624.95	717.99	590.01	501.70	485.38	613.94	525.86	542.99	450.74	583.00	550.99
. Managua (GECSA)	243.38	283.15	197.15	61.77	220.39	361.45	339.94	385.85	238.95	230.53	266.80	205.38	200.62	235.14	195.00	198.94	227.72
. Censa							120.78	213.90	166.39	142.94	250.19	196.34	297.76	327.66	328.12	319.51	224.33
. Empresa Energética de Corinto									129.74	503.22	524.68	511.89	533.55	526.85	552.51	556.62	578.77
. Tipitapa Power Company									282.75	388.29	416.01	406.00	411.48	412.40	404.42	423.44	412.94
.Generadora San Rafael, S.A. (Gesarsa)														5.60	0.00	0.00	4.59
. Nic.Sugar Estate Ltd. (NSEL)								30.80	35.88	42.60	46.86	83.34	115.03	149.24	202.22	184.91	216.55
. Monte Rosa												47.34	66.78	84.51	149.40	137.87	164.12
. Agroindustrial Azucarera S.A. (Timal)						29.44	29.32	28.20	19.01	28.48	0.96						
Plantas Hidroeléctricas	336.68	256.95	482.96	383.21	406.91	430.71	407.14	295.56	393.26	209.55	196.80	303.34	297.39	320.97	433.10	307.61	306.47
. Centroamérica (HIDROGESA)	199.04	154.75	272.71	225.55	216.09	242.32	242.09	177.53	260.24	125.49	130.18	187.04	176.43	203.59	236.32	192.63	173.43
. Santa Bárbara (HIDROGESA)	134.45	98.40	203.64	151.96	181.87	180.18	156.19	112.46	129.51	81.72	66.53	116.30	120.96	117.39	196.78	114.98	132.07
. Wabule	1.52	2.11	2.67	3.02	3.65	0.96	3.05	2.81	-								
. Las Canoas	1.67	1.70	3.94	2.69	5.29	7.25	5.81	2.76	3.50	2.35	0.10						
. Atder - Bl. El Bote																	0.98
Plantas Turbinas a Gas	0.67	0.46	19.01	115.42	88.52	23.46	91.13	300.46	143.87	59.76	49.15	12.84	21.65	27.54	27.04	72.30	236.16
. Chinandega (GEOSA)	0.67	0.12	-	5.63	22.75	2.17	17.50	39.48	18.98	3.82	2.55	0.29	0.73	0.71	0.49	0.82	-
. Las Brisas (GECSA)		0.35	19.01	109.79	65.76	21.28	73.62	260.98	124.89	55.94	46.60	12.54	20.92	26.83	26.55	71.48	133.55
. Hugo Chavez (GECSA) - Motores Combustión Int.																	102.61
Plantas Geotérmicas	457.69	467.97	405.55	359.51	309.55	276.50	208.75	120.53	102.14	134.16	206.08	210.27	270.70	254.84	270.76	310.99	243.24
. Ormat Momotombo Power Company a/	457.69	467.97	405.55	359.51	309.55	276.50	208.75	120.53	102.14	134.16	206.08	210.27	270.70	254.84	251.18	254.81	174.28
. Polaris Energy Nicaragua, S.A. (PENSA)															19.58	56.19	68.95
Sistema Interconectado Nacional (SIN)	1,376.58	1,507.91	1,611.86	1,619.20	1,705.81	1,850.56	1,822.01	2,093.29	2,102.01	2,241.22	2,442.91	2,590.69	2,740.82	2,887.74	3,013.32	3,095.19	3,165.89
Sistemas Aislados (Diesel Oil)	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	17.55	12.74	13.77	16.99	18.83	22.33
Sistemas Aislados (Fuel Oil)												11.24	17.82	19.01	20.44	22.99	20.85
Sistemas Aislados (Hidro)												0.47	0.59	0.55	0.51	0.44	0.09
Sistemas Aislados	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	29.26	31.14	33.34	37.95	42.25	43.27
TOTAL (S.I.N. +Aislados)	1,393.62	1,528.60	1,634.71	1,643.11	1,727.31	1,864.02	1,836.23	2,110.53	2,123.47	2,262.69	2,471.93	2,619.94	2,771.96	2,921.08	3,051.27	3,137.44	3,209.17

GENERACION BRUTA POR TIPO DE COMBUSTIBLE
(GWH)

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
S.I.N.	1,376.58	1,507.91	1,611.86	1,619.20	1,705.81	1,850.56	1,822.01	2,093.29	2,102.01	2,241.22	2,442.91	2,590.69	2,740.82	2,887.74	3,013.32	3,095.19	3,165.89
Térmicas (Bunker)	581.53	782.52	704.34	761.07	900.82	1,090.46	1,085.67	1,317.74	1,407.85	1,766.67	1,943.06	1,933.56	1,969.27	2,050.64	1,930.79	2,081.51	1,999.35
Térmicas (Diesel)	0.67	0.46	19.01	115.42	88.52	23.46	91.13	300.46	143.87	59.76	49.15	12.84	21.65	27.54	27.04	72.30	236.16
Térmicas (Bagazo de Caña)	0.00	0.00	0.00	0.00	0.00	29.44	29.32	59.00	54.89	71.09	47.82	130.69	181.81	233.75	351.62	322.78	380.67
Hidroeléctricas	336.68	256.95	482.96	383.21	406.91	430.71	407.14	295.56	393.26	209.55	196.80	303.34	297.39	320.97	433.10	307.61	306.47
Geotérmicas	457.69	467.97	405.55	359.51	309.55	276.50	208.75	120.53	102.14	134.16	206.08	210.27	270.70	254.84	270.76	310.99	243.24
SISTEMAS AISLADOS	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	29.26	31.14	33.34	37.95	42.25	43.27
Térmicas (Fuel Oil)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.24	17.82	19.01	20.44	22.99	20.85
Térmicas (Diesel)	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	17.55	12.74	13.77	16.99	18.83	22.33
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.59	0.55	0.51	0.44	0.09
NACIONAL	1,393.62	1,528.60	1,634.71	1,643.11	1,727.31	1,864.02	1,836.23	2,110.53	2,123.47	2,262.69	2,471.93	2,619.94	2,771.96	2,921.08	3,051.27	3,137.44	3,209.17

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Instituto Nicaragüense de Energía
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Estadísticas del Sector Eléctrico

GENERACION BRUTA POR TIPO DE GENERACION
(GWH)

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hidroeléctricas	336.68	256.95	482.96	383.21	406.91	430.71	407.14	295.56	393.26	209.55	196.80	303.34	297.39	320.97	433.10	307.61	306.47
Geotérmicas	457.69	467.97	405.55	359.51	309.55	276.50	208.75	120.53	102.14	134.16	206.08	210.27	270.70	254.84	270.76	310.99	243.24
Termoeléctricas (Fuel Oil + Diesel)	582.20	782.99	723.35	876.49	989.34	1,113.92	1,176.80	1,618.20	1,551.72	1,826.43	1,992.21	1,946.39	1,990.92	2,078.18	1,957.84	2,153.81	2,235.51
Térmicas (Bagazo de Caña)	0.00	0.00	0.00	0.00	0.00	29.44	29.32	59.00	54.89	71.09	47.82	130.69	181.81	233.75	351.62	322.78	380.67
TOTAL S.I.N.	1,376.58	1,507.91	1,611.86	1,619.20	1,705.81	1,850.56	1,822.01	2,093.29	2,102.01	2,241.22	2,442.91	2,590.69	2,740.82	2,887.74	3,013.32	3,095.19	3,165.89
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.59	0.55	0.51	0.44	0.09
Termoeléctricas (Fuel Oil + Diesel)	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	28.79	30.56	32.79	37.44	41.82	43.18
TOTAL AISLADOS	17.04	20.69	22.85	23.91	21.50	13.46	14.22	17.23	21.46	21.47	29.02	29.26	31.14	33.34	37.95	42.25	43.27
Hidroeléctricas	336.68	256.95	482.96	383.21	406.91	430.71	407.14	295.56	393.26	209.55	196.80	303.80	297.98	321.52	433.61	308.05	306.57
Geotérmicas	457.69	467.97	405.55	359.51	309.55	276.50	208.75	120.53	102.14	134.16	206.08	210.27	270.70	254.84	270.76	310.99	243.24
Termoeléctricas (Fuel Oil + Diesel)	599.24	803.68	746.20	900.39	1,010.84	1,127.38	1,191.02	1,635.44	1,573.17	1,847.90	2,021.23	1,975.18	2,021.48	2,110.97	1,995.27	2,195.62	2,278.69
Térmicas (Bagazo de Caña)	0.00	0.00	0.00	0.00	0.00	29.44	29.32	59.00	54.89	71.09	47.82	130.69	181.81	233.75	351.62	322.78	380.67
TOTAL NACIONAL	1,393.62	1,528.60	1,634.71	1,643.11	1,727.31	1,864.02	1,836.23	2,110.53	2,123.47	2,262.69	2,471.93	2,619.94	2,771.96	2,921.08	3,051.27	3,137.44	3,209.17

GENERACION BRUTA POR TIPO DE GENERACION
(%)

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hidroeléctricas	24.16	16.81	29.54	23.32	23.56	23.11	22.17	14.00	18.52	9.26	7.96	11.58	10.73	10.99	14.19	9.80	9.55
Geotérmicas	32.84	30.61	24.81	21.88	17.92	14.83	11.37	5.71	4.81	5.93	8.34	8.03	9.77	8.72	8.87	9.91	7.58
Termoeléctricas (Fuel Oil + Diesel)	41.78	51.22	44.25	53.34	57.28	59.76	64.09	76.67	73.07	80.72	80.59	74.29	71.82	71.14	64.16	68.65	69.66
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	1.58	1.60	2.80	2.59	3.14	1.93	4.99	6.56	8.00	11.52	10.29	11.86
TOTAL S.I.N.	98.78	98.65	98.60	98.54	98.76	99.28	99.23	99.18	98.99	99.05	98.83	98.88	98.88	98.86	98.76	98.65	98.65
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.01	0.00
Termoeléctricas (Fuel Oil + Diesel)	1.22	1.35	1.40	1.46	1.24	0.72	0.77	0.82	1.01	0.95	1.17	1.10	1.10	1.12	1.23	1.33	1.35
TOTAL AISLADOS	1.22	1.35	1.40	1.46	1.24	0.72	0.77	0.82	1.01	0.95	1.17	1.12	1.12	1.14	1.24	1.35	1.35
Hidroeléctricas	24.16	16.81	29.54	23.32	23.56	23.11	22.17	14.00	18.52	9.26	7.96	11.60	10.75	11.01	14.21	9.82	9.55
Geotérmicas	32.84	30.61	24.81	21.88	17.92	14.83	11.37	5.71	4.81	5.93	8.34	8.03	9.77	8.72	8.87	9.91	7.58
Termoeléctricas (Fuel Oil + Diesel)	43.00	52.58	45.65	54.80	58.52	60.48	64.86	77.49	74.08	81.67	81.77	75.39	72.93	72.27	65.39	69.98	71.01
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	1.58	1.60	2.80	2.59	3.14	1.93	4.99	6.56	8.00	11.52	10.29	11.86
TOTAL NACIONAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

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Estadísticas del Sector Eléctrico

GENERACION NETA POR TIPO DE PLANTA
(GWH)

DESCRIPCION	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Plantas Térmicas	**543.61**	**735.47**	**659.31**	**723.24**	**842.82**	**1,029.30**	**1,027.68**	**1,274.16**	**1,370.30**	**1,713.10**	**1,878.15**	**1,926.57**	**2,008.09**	**2,082.79**	**2,045.59**	**2,183.35**	**2,144.19**
. Nicaragua (GEOSA)	321.19	477.25	482.05	666.76	636.64	680.73	583.64	672.18	552.00	468.15	452.44	571.25	487.11	505.28	419.68	546.15	515.98
. Managua (GECSA)	222.42	258.22	177.27	56.47	206.19	334.73	312.44	357.58	222.17	212.54	241.92	183.05	183.87	216.88	179.17	180.02	211.42
. Censa - AMFELS							117.71	208.29	161.89	138.46	242.60	189.91	289.17	318.51	319.61	314.24	217.65
. Empresa Energética de Corinto									123.06	477.90	497.47	485.14	505.95	499.59	523.87	528.40	550.12
. Tipitapa Power Company									278.16	382.60	410.21	401.44	407.89	409.06	399.83	420.18	409.24
Generadora San Rafael, S.A. (Gesarsa)														. 5.55	0.00	0.00	4.50
. Nic.Sugar Estate Ltd. (NSEL)								23.69	25.05	27.19	32.55	72.99	97.36	84.19	113.60	100.42	122.38
. Monte Rosa												22.80	36.74	43.73	89.83	93.93	112.90
. Agroindustrial Azucarera S.A. (Timal)						13.85	13.89	12.42	7.98	6.25	0.96						
Plantas Hidroeléctricas	**335.63**	**255.98**	**481.56**	**375.29**	**398.58**	**423.99**	**397.94**	**288.66**	**385.53**	**204.13**	**189.50**	**296.05**	**291.76**	**311.41**	**426.25**	**299.25**	**300.56**
. Centroamérica (HIDROGESA)	198.56	154.30	272.12	218.38	208.59	236.40	233.67	171.27	253.15	120.68	123.46	180.20	171.31	194.59	230.25	184.88	168.17
. Santa Bárbara (HIDROGESA)	133.92	97.93	202.93	151.30	181.17	179.51	155.56	111.90	128.96	81.16	65.95	115.85	120.45	116.82	196.00	114.37	131.41
. Wabule	1.50	2.08	2.65	2.99	3.61	0.94	3.02	2.78	-	-	-	-	-				
. Las Canoas	1.64	1.66	3.88	2.63	5.20	7.14	5.69	2.71	3.42	2.29	0.09	-	-				
. Aider - BL El Bote																	0.97
Plantas Turbinas a Gas	**0.67**	**0.46**	**18.89**	**115.06**	**88.22**	**23.31**	**90.66**	**296.36**	**138.79**	**57.55**	**44.91**	**11.11**	**18.86**	**26.00**	**25.34**	**69.13**	**206.94**
. Chinandega (GEOSA)	0.67	0.12	-	5.59	22.55	2.13	17.18	38.73	18.64	3.75	2.50	0.18	0.72	0.70	0.49	0.82	0.00
. Las Brisas (GECSA)	-	0.35	18.89	109.47	65.66	21.18	73.48	257.63	120.15	53.80	42.41	10.94	18.14	25.29	24.85	68.31	107.12
. Hugo Chavez (GECSA) - Motores Combustión Int.																	99.81
Plantas Geotérmicas	**427.66**	**435.10**	**376.62**	**327.84**	**280.75**	**243.27**	**187.37**	**107.13**	**90.39**	**120.75**	**187.56**	**191.22**	**242.40**	**227.16**	**241.21**	**276.98**	**211.06**
. Ormat Momotombo Power Company a/	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	223.17	225.58	146.45
. Polaris Energy Nicaragua, S.A. (Pensa)															18.05	51.39	64.62
Sistema Interconectado Nacional (SIN)	1,307.57	1,427.01	1,536.39	1,541.43	1,610.38	1,719.87	1,703.66	1,966.30	1,985.02	2,095.53	2,300.11	2,424.96	2,561.11	2,647.35	2,738.39	2,828.71	2,862.75
Sistemas Aislados (Diesel Oil)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	17.34	12.58	13.63	16.80	18.50	21.92
Sistemas Aislados (Fuel Oil)												10.90	17.33	18.42	19.70	22.09	19.87
Sistemas Aislados (Hidro)												0.30	0.42	0.40	0.37	0.31	0.06
Sistemas Aislados	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	28.53	30.34	32.45	36.87	40.90	41.86
TOTAL (S.I.N. +Aislados)	1,324.20	1,446.57	1,558.42	1,564.43	1,631.18	1,733.02	1,717.54	1,983.23	2,006.15	2,116.60	2,328.61	2,453.49	2,591.44	2,679.81	2,775.26	2,869.61	2,904.60

a/ A partir del mes de Julio de 1999 dada en arrendamiento a la empresa Ormat International Inc.

S.I.N. = Plantas Térmicas + Hidroeléctricas + Turbinas a Gas + Geotérmica.

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GENERACION NETA POR TIPO DE COMBUSTIBLE

(GWH)

DESCRIPCION	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
S.I.N.	1,307.57	1,427.01	1,536.39	1,541.43	1,610.38	1,719.87	1,703.66	1,966.30	1,985.02	2,095.53	2,300.11	2,424.96	2,561.11	2,647.35	2,738.39	2,828.71	2,862.75
Térmicas (Fuel Oil)	543.61	735.47	659.31	723.24	842.82	1,015.45	1,013.79	1,238.05	1,337.27	1,679.65	1,844.65	1,830.78	1,873.99	1,954.87	1,842.16	1,989.00	1,908.90
Térmicas (Diesel)	0.67	0.46	18.89	115.06	88.22	23.31	90.66	296.36	138.79	57.55	44.91	11.11	18.86	26.00	25.34	69.13	206.94
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.05	291.76	311.41	426.25	299.25	300.56
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
SISTEMAS AISLADOS	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	28.53	30.34	32.45	36.87	40.90	41.86
Térmicas (Fuel Oil)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.90	17.33	18.42	19.70	22.09	19.87
Térmicas (Diesel)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	17.34	12.58	13.63	16.80	18.50	21.92
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.42	0.40	0.37	0.31	0.06
NACIONAL	1,324.20	1,446.57	1,558.42	1,564.43	1,631.18	1,733.02	1,717.54	1,983.23	2,006.15	2,116.60	2,328.61	2,453.49	2,591.44	2,679.81	2,775.26	2,869.61	2,904.60

PLANTAS ELECTRICAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.05	291.76	311.41	426.25	299.25	300.56
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
Termoeléctricas (Fuel Oil + Diesel)	544.28	735.93	678.21	838.29	931.04	1,038.77	1,104.45	1,534.41	1,476.07	1,737.20	1,889.55	1,841.89	1,892.85	1,980.86	1,867.50	2,058.12	2,115.84
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
TOTAL S.I.N.	1,307.57	1,427.01	1,536.39	1,541.43	1,610.38	1,719.87	1,703.66	1,966.30	1,985.02	2,095.53	2,300.11	2,424.96	2,561.11	2,647.35	2,738.39	2,828.71	2,862.75
Hidroeléctricas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.42	0.40	0.37	0.31	0.06
Termoeléctricas (Fuel Oil + Diesel)	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	28.24	29.92	32.05	36.49	40.59	41.79
TOTAL AISLADOS	16.63	19.56	22.02	23.00	20.80	13.15	13.88	16.92	21.13	21.07	28.49	28.53	30.34	32.45	36.87	40.90	41.86
Hidroeléctricas	335.63	255.98	481.56	375.29	398.58	423.99	397.94	288.66	385.53	204.13	189.50	296.34	292.18	311.82	426.62	299.57	300.62
Geotérmicas	427.66	435.10	376.62	327.84	280.75	243.27	187.37	107.13	90.39	120.75	187.56	191.22	242.40	227.16	241.21	276.98	211.06
Termoeléctricas (Fuel Oil + Diesel)	560.92	755.48	700.23	861.29	951.84	1,051.91	1,118.33	1,551.33	1,497.20	1,758.27	1,918.05	1,870.13	1,922.76	2,012.91	1,904.00	2,098.71	2,157.63
Térmicas (Residuos Vegetales)	0.00	0.00	0.00	0.00	0.00	13.85	13.89	36.11	33.02	33.45	33.50	95.79	134.10	127.92	203.43	194.35	235.29
TOTAL NACIONAL	1,324.20	1,446.57	1,558.42	1,564.43	1,631.18	1,733.02	1,717.54	1,983.23	2,006.15	2,116.60	2,328.61	2,453.49	2,591.44	2,679.81	2,775.26	2,869.61	2,904.60

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Estadísticas del Sector Eléctrico

CONSUMO DE COMBUSTIBLE POR TIPO DE PLANTA
SISTEMA INTERCONECTADO NACIONAL Y SISTEMAS AISLADOS

PLANTAS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Térmicas (Fuel Oil - 10^3 Glns)	47,585.10	62,707.53	57,124.69	56,674.33	68,582.00	82,190.91	79,614.71	98,197.65	99,642.09	116,049.43	127,558.11	128,004.93	128,480.58	133,464.66	124,671.75	136,273.13	130,457.76
. Nicaragua (GEOSA)	25,956.80	37,459.85	38,478.94	50,676.29	50,508.00	53,983.19	46,564.71	52,737.58	43,817.31	37,616.49	36,752.84	46,280.85	39,498.28	40,256.17	33,536.96	43,240.21	40,967.70
. Nicaragua (Calentamiento)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.57	26.86	0.00	0.00	0.00	0.00	0.00	0.00
. Managua (GECSA)	21,628.30	25,247.68	18,645.76	5,998.05	18,074.00	28,207.72	25,672.84	28,054.96	17,561.86	17,135.95	20,388.82	15,979.15	15,747.86	18,482.38	15,311.28	16,283.07	17,522.80
. Managua (Calentamiento)											3.11	0.00	0.00	0.00	0.00	0.00	0.00
. Censa - AMFELS							7,377.17	13,917.78	10,827.60	9,143.99	15,606.52	12,058.15	18,148.19	19,795.32	20,002.95	19,381.30	13,837.01
. Empresa Energética de Corinto									7,394.59	28,768.58	29,766.59	29,219.09	30,281.49	29,849.61	31,348.35	31,744.26	32,845.77
. Tipitapa Power Company									16,922.91	23,209.44	24,915.74	24,394.97	24,672.47	24,640.70	24,472.21	25,597.28	25,013.43
. Generadora San Rafael, S.A. (Gesarsa)														440.47			271.05
. Nic.Sugar Estate Ltd. (NSEL)								3,487.32	3,117.83	138.42	7.65	72.71	132.29	0.00	0.00	27.01	0.00
Térmicas + Turbinas a Gas (Diesel - 10^3 Glns)						22.74	40.99	15.65	76.58	67.85	80.31	132.53	320.52	93.98	68.31	102.58	122.70
. Managua (Geración + Calentamiento)						22.74	40.99	15.65	13.38	3.04	2.76	1.07	0.24	0.00	0.00	0.00	0.00
. Empresa Energética Corinto (Calentamiento)									63.20	62.45	73.53	128.48	316.93	93.98	66.76	101.78	108.63
. Tipitapa Power Company																	12.95
. Las Brisas (Calentamiento)										0.42	2.15	0.69	3.36	0.00	0.00	0.00	0.00
. Chinandega (Calentamiento)										1.94	1.86	2.29	0.00	0.00	1.55	0.80	1.12
Térmicas (10^3 Ton. Bagazo de Caña)						179.29	178.59	171.76	161.66	350.09	147.36	432.08	531.67	924.92	1,010.79	950.94	1,103.37
. Nic.Sugar Estate Ltd. (NSEL)									47.65	176.64	147.36	174.93	269.12	494.36	585.44	563.41	640.29
. Monte Rosa												257.15	262.55	430.56	425.35	387.53	463.08
. Agroindusirial Azucarera S.A. (Timal)						179.29	178.59	171.76	114.00	173.45							
Térmicas (Toneladas Métricas de)																	
. Nic.Sugar Estate Ltd. (NSEL) - Leña										7,768.62	0.00	27,624.00	21,489.00	50,670.40	25,972.84	26,746.42	29,334.24
. Monte Rosa, S.A. - Leña												852.71	360.90	1,071.43	203.04	300.74	0.00
. Nic.Sugar Estate Ltd. (ISA) - Casc.Arroz										6,913.00	0.00	0.00	6,333.00	0.00	0.00	0.00	0.00
Hidroeléctricas ($10^6 m^3$ de Agua)	645.41	499.75	939.21	739.69	835.77	808.72	851.01	597.65	783.90	429.81	350.90	552.38	544.46	582.11	801.60	558.93	578.36
. Centroamérica (HIDROGESA)	330.40	257.15	443.33	373.08	360.19	402.25	402.14	294.70	432.00	208.31	212.28	310.48	292.86	337.95	392.29	319.77	299.41
. Santa Bárbara (HIDROGESA)	279.66	204.66	423.57	316.07	378.29	374.78	324.88	233.91	269.39	169.97	138.62	241.90	251.60	244.16	409.31	239.16	274.70
. Wabule	5.20	7.05	8.92	10.10	12.20	31.70	123.99	7.37	0.00	0.00							
. Las Canoas	30.14	30.88	63.40	40.45	85.09			61.66	82.50	51.53							
. Atder - BL. El Bote																	4.25
Turbinas a Gas + Térmicas (Diesel Oil - 10^3 Glns)	87.40	51.59	1,852.70	10,988.73	8,968.10	2,420.62	9,107.10	25,414.79	11,328.08	4,929.67	3,982.99	972.33	1,760.50	2,175.64	2,068.12	5,020.33	17,697.62
. Chinandega (GEOSA)	87.40	16.01	0.00	691.77	2,695.80	260.96	1,973.79	4,475.12	2,130.18	438.76	334.96	33.37	97.69	97.08	67.27	110.68	0.00
. Las Brisas (GECSA)		35.58	1,852.70	10,296.96	6,272.30	2,159.66	7,133.32	20,939.67	9,197.90	4,490.91	3,648.03	938.97	1,662.80	2,078.56	2,000.85	4,909.66	10,568.39
. Hugo Chavez (GECSA) - Motores Combustión Int.																	7,084.57
. Generadora San Rafael, S.A. (Gesarsa)														92.38			44.65
Geotérmicas (10^3 Ton/Vapor)	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,990.78	2,532.61	2,055.39
. Ormat Momotombo Power Company a/	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,699.73	1,730.53	1,069.42
. Polaris Energy Nicaragua, S.A. (Pensa)															291.05	802.08	985.97
. Ormat Energy Converters (OEC) - MMC Agua Caliente													9,532.62	8,724.48	9,146.49	9,239.55	7,713.66
Sistemas Aislados (Diesel Oil - 10^3 Glns)	1,346.34	1,601.35	1,874.94	1,966.98	1,772.38	1,138.61	1,215.47	1,380.67	1,841.91	1,872.91	1,964.49	1,531.13	1,130.34	1,171.31	2,090.34	1,784.66	2,028.64
Sistemas Aislados (Fuel Oil - 10^3 Glns)												782.81	1,266.46	1,381.36	961.31	1,456.43	1,391.74
Sistemas Aislados (Agua - $10^6 m^3$)												1,389.90	1,380.87	1,465.10	1,515.76	1,304.24	282.25
RESUMEN																	
Total Fuel Oil (10^3 Glns)	47,585.10	62,707.53	57,124.69	56,674.33	68,582.00	82,190.91	79,614.71	98,197.65	99,642.09	116,049.43	127,558.11	128,787.73	129,747.05	134,846.02	125,633.06	137,729.56	131,849.50
Total Diesel (10^3 Glns)	1,433.74	1,652.94	3,727.64	12,955.71	10,740.48	3,581.97	10,363.56	26,811.10	13,246.58	6,870.43	6,027.78	2,635.99	3,211.36	3,440.93	4,226.77	6,907.57	19,848.96
Total Vapor Geotérmico (10^3 Ton/Vapor)	3,995.20	4,405.93	3,863.94	3,775.60	3,329.20	3,177.04	2,333.36	1,432.73	1,195.00	1,487.06	2,055.55	1,945.04	1,740.61	1,758.33	1,990.78	2,532.61	2,055.39
Total Agua ($10^6 m^3$)	645.41	499.75	939.21	739.69	835.77	808.72	851.01	597.65	783.90	429.81	350.90	553.77	545.84	583.58	803.12	560.23	578.65
Total Agua Caliente (Salmuera) 10^3 M^3													9,532.62	8,724.48	9,146.49	9,239.55	7,713.66
Total Leña (Toneladas)										7,768.62	0.00	28,656.71	21,849.90	51,741.83	26,175.88	27,047.16	29,334.24
Total Cascarilla Arroz (Toneladas)										6,913.00	0.00	0.00	6,333.00	0.00	0.00	0.00	0.00
Total Bagazo de Caña (10^3 Toneladas)						179.29	178.59	171.76	161.66	350.09	147.36	432.08	531.67	924.92	1,010.79	950.94	1,103.37
Total Fuel Oil (10^3 Barriles)	1,132.98	1,493.04	1,360.11	1,349.39	1,632.90	1,956.93	1,895.59	2,338.04	2,372.43	2,763.08	3,037.10	3,066.37	3,089.22	3,210.62	2,991.26	3,279.28	3,139.27
Total Diesel (10^3 Barriles)	34.14	39.36	88.75	308.47	255.73	85.29	246.75	638.36	315.39	163.58	143.52	62.76	76.46	81.93	100.64	164.47	472.59

MMC = Miles de Metros Cúbicos.

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Annex 4

MONITORING INFORMATION

Data and parameters monitored:	
(Copy this table for each data and parameter)	
Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Annual electricity supplied by the project activity to the grid.
Source of data to be used:	ATDER-BL
Value of data	5,800
Description of measurement methods and procedures to be applied:	The electricity supplied to the grid will be monitored by meters installed in the substation to measure the energy generated. Meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards and international standards (IEC, ISO). The total energy delivered to the grid will also be tracked by the Nicaraguan Energy Institute (INE, the national regulator), which keeps an official record.
QA/QC procedures to be applied:	Production records will be crosschecked with the record of sales to the grid.
Any comment:	

Annex 5

ADDITIONALITY

Without implementation of the El Bote Small Hydroelectric project, the electrification of the Cuá–Bocay area would have proceded with energy from the national grid produced with a mix of fuels as shown in the base-line calculations. In 1990 only 52% of Nicaraguans had access to electric service. By 2000 the percentage had increased to approximately 58%. In 2010 65% of the population has electric service, and the government has announced goals of achieving 85% electricity coverage by the year 2015. To guarantee the availability of sufficient electric energy for this process, the goverment has tried to encourage private development of the country's renewable energy resources, but this has been slow and difficult due to the high initial investment costs of wind, geothermal and hydroelectric generating plants, and the generally poor investment conditions in the country. During recent years, to assure sufficient energy availability to move forward with the rural electrification goals, the government has installed several new fuel-oil burning plants (the "Hugo Chavez" fuel-oil and diesel plants) which are fast to put in service, require low initial investment costs, and have been financed by the government of Venezuela as part of a bilateral trade package.

These developments in the electricity generation sector of the Nicaraguan economy are dominated by the government and are outside the control of ATDER-BL. The alternative to construction of the El Bote small hydroelectric plant was the supply of electricity from a grid, which (see Annex 45 of the UNFCC/CCNUCC Methodology Tool for the demonstration and assessment of additionality, version 05.2, paragraph 15) is not to be considered an investment for comparison of the relative financial attractivity of the renewable energy option. The choice of ATDER-BL was "to invest, or not to invest". Hence the additionality of the El Bote hydroelectric project is demnostrated by presenting two contrasting Equity Financial Projections, using a benchmark approach.

On the following four pages of this Annex, we show two financial scenarios for the El Bote Small Hydroelectric plant, using, as input values, the electricity purchase and sale prices, bank loan terms, applicable taxes, etc. that existed when ATDER-BL made the decision to proceed with this investment and signed its loan contract in December 2004. These are Equity Projections with a discout rate of 12%. The first scenario includes the sale of Carbon Emisions Reductions as one of the sources of income of the project. The financial results or "indicators" of this projection are:
IRR = 12.6% and Net Present Value = US$ 39351. (See Financial Analysis, 20-year projection WITH CERs).

The second scenario is identical to the first scenario in all aspects, except that the cell containing the value of CERs in the spreadsheet is put to zero, to represent operation of the project WITHOUT sale of CERs. The financial indicators of this second projection are: IRR = 7.9% and Net Present Value = negative US$ -242577.

ATDER-BL is an NGO that does not require a profitable return on investment, but, like any other private actor in any economy, it cannot sustainably operate a project that has a negative Net Present Value. Without sale of CERs the project is financially un-viable. The negative result of NPV in the financial scenario (without sale of CERs) indicates that the project without CERs falls below this minimal criteria, or benchmark, of financial viability, since the NPV is less than zero.

FINANCIAL PROJECTION WITH CARBON CREDITS

Project name		**EL BOTE**	
Type of project		Small Hydroelectric Plant	
Installed generating capacity		940 kw	interconnected to national grid
Net Head	112.5	meters	
Design Flow	1.05	m3/sec	
Availability of this flow	37%	(% exceedence on the flow duration curve of the site)	
Theoretical Annual Electricity output of this renewable energy source	5,800	Mwh/year	
Electricity generation lost due to defects in the grid of the neighboring distribution company	20%		
Net projected annual electricy generation	4,640	Mwh/year	
Consumption in the powerplant (lighting, ballast, etc.)	1.2	Mwh/year	
NET ANNUAL ENERGY OUTPUT	4,639		
Initial number of domestic customers, small businesses, offices, etc.	1,100	at end of 2006	
Average consumption	48.0	kwhrs / month 0.576 Mwh/year	
Annual growth rate projected	3.00%	based on population growth rate of the national statistics office: INEC 2000-2005	
Average peak demand per customer	250	watts	

Reduction of emissions of greenhouse gases:

relation of GGE :	Substitution of generation by isolated diesel plant	0.952	Ton CO_2/MWh
	Substitution of electricity from the National Electric Grid, Weighted average GGE	0.665	Ton CO_2/MWh
value :	US$ Reduction of emissions of Greenhouse Gases	$20.00	/ tonCO_2

		year 2004	2005	2006	2007	2008		
YEAR →		**0**	**1**	**2**	**3**	**4**	**5**	**6**
Generating Capacity of the Small Hydroelectric Plant and uses of the Energy :								
Net Annual energy output	Mwh/year				1,319.40	4,638.80	4,638.80	4,638.80
Sales in the Local grid (El Bote, El Cua and other communities)	Mwh/year				336.09	692.35	713.12	734.52
Energy losses in the local grid as a percentage of the energy sales	Mwh/year	20%			67.22	138.47	142.62	146.90
Excess energy available after covering the local demand	Mwh/year				916.09	3,807.98	3,783.05	3,757.38
Energy Losses in sale to the National Electric Grid	Mwh/year	5%			45.80	190.40	189.15	187.87
Sales to the National Grid	Mwh/year				870.28	3,617.58	3,593.90	3,569.51
Energy (required) when hydro plant is out of service for maintenance, resynchronization, water shortage, etc. [Purchase from DISNORTE]	Mwh/year	4%			34.81	144.70	143.76	142.78
Peak Hour Demand in the local grid	kw				291.7	300.5	309.5	318.8
TOTAL ANNUAL INCOME	**US$**				**129,759**	**391,389**	**471,281**	**474,115**
A. Sales of Electricity in the local grid	Mwh/year				**336.09**	**692.35**	**713.12**	**734.52**
Domestic customers, small businesses, offices, farms, etc.	quantity				1,167	1,202	1,238	1,275
Annual average energy billed (per customer)	Mwh	/customer			0.576	0.576	0.576	0.576
Income from Sales of electricity in the Local Grid	**US$**				**70,580**	**145,394**	**149,756**	**154,248**
B. Sales of Electricity to the National Grid	Mwh/year				**870**	**3,618**	**3,594**	**3,570**
Income from Sales of electricity to the National Grid	**US$**				**59,179**	**245,995**	**244,385**	**242,727**
C. Reduction of Emissions of Greenhouse Gases in sales to the National Grid		**Tons CO2**			**877**	**3,857**	**3,857**	**3,857**
Income for Reduction of Greenhouse Gases in sales to the National Grid		**US$**			**-**	**-**	**77,140**	**77,140**
TOTAL EXPENDITURES	**US$**				**329,201**	**323,023**	**381,270**	**381,456**
INVESTMENTS	1,889,743	**155,000**	**632,500**	**727,400**	**360,343**	**14,500**		
A. Engineering, Administration and general expenses								
Engineering	$ 33,481	9,000	9,000	9,000	6,481			
General Expenses	$ 55,597	4,000	5,000	28,000	18,597			
B. Civil Works of the Small Hydroelectric Plant								
Access Roads and Project Buildings	$ 52,501	25,000		24,400	3,101			
Construction of the Dam/Weir/Intake	$ 123,996	112,000	2,500	5,000	4,496			
Purchase and Installation of steel and PVC pipes	$ 288,838		115,000	165,000	8,838			
Construction of Powerhouse, tailrace canal and Operators' house	$ 121,500		30,000	85,000	6,500			
C. Electromechanical Equipment								
Purchase of Equipment	$ 733,630		450,000	270,000	13,630			
Instalation of Electromechanical Equipment	$ 120,500			70,000	50,500			
D. Indirect Costs (bank interest during construction, start-up capital)	$ 182,000		11,000	11,000	160,000			
E. Watershed conservation activities	$ 163,200	5,000	10,000	60,000	88,200			
F. Instalation of Metering Equipment in the El Bote hydro plant for CER sales	$ 14,500					14,500		
G. Operating costs					**179,201**	**205,730**	**205,678**	**205,624**
Operation & Maintenance costs					172,239	172,239	172,239	172,239
Cost of energy purchased when the El Bote plant is off line for repairs or maintenance					6,962	28,941	28,751	28,556
Overhaul of electromechanical equipment, El Bote, at 15 year intervals								
Costs of extending the electric grid and connecting new customers						4,551	4,688	4,828
Operating Balance					**-49,442**	**185,659**	**265,603**	**268,492**
H. Financial Costs					**150,000**	**117,121**	**175,367**	**175,367**
Principal					0	41,864	100,110	100,110
Interest					150,000	75,257	75,257	75,257
Loan Balance					1,301,465	1,259,600	1,159,490	1,059,380
I. Depreciation					**45,902**	**45,902**	**45,902**	**45,902**
Balance before Taxes					**-199,442**	**68,538**	**90,236**	**93,125**
J. Taxes					**0**	**171**	**226**	**466**
Income Tax (30%), waived during the first 7 years of operation of a hydroelectric plant	30%				0	0	0	0
Municipal Tax (1%), applied 0%, 25%, 50%, 75% & 100% during first 10 years	1%				0	171	226	466
Net Balance					**-199,442**	**68,366**	**90,011**	**92,659**
I. Depreciation					45,902	45,902	45,902	45,902
K. Residual Value								
CASH FLOW		**-588,313**	**0**	**0**	**-153,540**	**114,268**	**135,913**	**138,561**

Net Present Value	**$ 39,351**
Internal Rate of Return	**12.6%**

FINANCIAL PROJECTION WITH CARBON CREDITS

Tariff charged for electricity, local sales		$0.2100	/ kwh	Energy losses, local sales	25%
Sale Price of electricity, sales to National Grid		$0.0680	/ kwh	Energy losses, sales to National Grid	5%
Toll to Union Fenosa por use of 24.9 kv lines		$0.0000	/ kwh		
Toll use of high-voltage transmission lines		$0.0000	/ kwh	Price of electricity purchased from DISNORTE	$0.200 / kwh
Total Project Investment		$1,889,743			
Loan	68.9 %	$1,301,430			
Equity	31.1 %	$588,313			
				Annual depreciation	$45,902
Annual O&M costs (see Appendix E)		$ 172,239		Residual value of investment @ 20 years	$522,927
Cost of construction of local grid extensions		$ 130.00	/ new customer		
Life cycle *Civil Works*		50	years		
Electromechanical Equipment		25	years		
Interest rate of loan		5.5%		loan period	16 years
Discount rate		12.0%		grace period	3 years on the principal only

year	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80
	756.55	779.25	802.63	826.70	851.51	877.05	903.36	930.46	958.38	987.13	1,016.74	1,047.24	1,078.66	1,111.02
	151.31	155.85	160.53	165.34	170.30	175.41	180.67	186.09	191.68	197.43	203.35	209.45	215.73	222.20
	3,730.94	3,703.70	3,675.65	3,646.75	3,616.99	3,586.34	3,554.77	3,522.24	3,488.75	3,454.25	3,418.71	3,382.11	3,344.41	3,305.57
	186.55	185.19	183.78	182.34	180.85	179.32	177.74	176.11	174.44	172.71	170.94	169.11	167.22	165.28
	3,544.39	3,518.52	3,491.87	3,464.42	3,436.14	3,407.02	3,377.03	3,346.13	3,314.31	3,281.53	3,247.77	3,213.00	3,177.19	3,140.30
	141.78	140.74	139.67	138.58	137.45	136.28	135.08	133.85	132.57	131.26	129.91	128.52	127.09	125.61
	328.4	338.2	348.4	358.8	369.6	380.7	392.1	403.8	416.0	428.4	441.3	454.5	468.2	482.2
	477,034	**480,041**	**483,138**	**486,328**	**489,614**	**492,998**	**496,484**	**500,074**	**503,772**	**507,581**	**511,504**	**515,545**	**442,568**	**446,855**
	756.55	**779.25**	**802.63**	**826.70**	**851.51**	**877.05**	**903.36**	**930.46**	**958.38**	**987.13**	**1,016.74**	**1,047.24**	**1,078.66**	**1,111.02**
	1,313	1,353	1,393	1,435	1,478	1,523	1,568	1,615	1,664	1,714	1,765	1,818	1,873	1,929
	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
	158,876	**163,642**	**168,551**	**173,608**	**178,816**	**184,181**	**189,706**	**195,397**	**201,259**	**207,297**	**213,516**	**219,921**	**226,519**	**233,315**
	3,544	**3,519**	**3,492**	**3,464**	**3,436**	**3,407**	**3,377**	**3,346**	**3,314**	**3,282**	**3,248**	**3,213**	**3,177**	**3,140**
	241,019	**239,259**	**237,447**	**235,580**	**233,658**	**231,678**	**229,638**	**227,537**	**225,373**	**223,144**	**220,849**	**218,484**	**216,049**	**213,540**
	3,857	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**
	77,140	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**77,140**	**0**	**0**
	381,415	**381,373**	**381,329**	**412,955**	**414,186**	**415,182**	**416,497**	**417,562**	**418,660**	**419,790**	**551,185**	**301,150**	**278,472**	**279,744**
	205,567	**205,510**	**205,450**	**205,389**	**205,326**	**205,261**	**205,194**	**205,125**	**205,053**	**204,980**	**454,905**	**204,827**	**204,747**	**204,665**
	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239
	28,355	28,148	27,935	27,715	27,489	27,256	27,016	26,769	26,514	26,252	25,982	25,704	25,417	25,122
											250,000			
	4,973	5,122	5,276	5,434	5,597	5,765	5,938	6,117	6,300	6,489	6,684	6,884	7,091	7,303
	271,467	**274,532**	**277,688**	**280,939**	**284,288**	**287,738**	**291,290**	**294,950**	**298,719**	**302,601**	**56,600**	**310,718**	**237,820**	**242,190**
	175,367	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**96,280**	**0**	**0**	**0**
	100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	58,280			
	75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	38,000			
	959,270	859,160	759,050	658,940	558,830	458,720	358,610	258,500	158,390	58,280	0	0	0	0
	45,902	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**
	96,100	**99,165**	**102,321**	**105,572**	**108,921**	**112,370**	**115,923**	**119,583**	**123,352**	**127,234**	**-39,680**	**310,718**	**237,820**	**242,190**
	480	**496**	**512**	**32,200**	**33,493**	**34,554**	**35,936**	**37,071**	**38,239**	**39,442**	**0**	**96,323**	**73,724**	**75,079**
	0	0	0	31,672	32,676	33,711	34,777	35,875	37,006	38,170	0	93,215	71,346	72,657
	480	496	512	528	817	843	1,159	1,196	1,234	1,272	0	3,107	2,378	2,422
	95,619	**98,669**	**101,810**	**73,373**	**75,428**	**77,817**	**79,987**	**82,512**	**85,113**	**87,791**	**-39,680**	**214,396**	**164,096**	**167,111**
	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902
														522,927
	141,521	**144,571**	**147,711**	**119,275**	**121,330**	**123,718**	**125,889**	**128,414**	**131,015**	**133,693**	**6,221**	**260,297**	**209,998**	**735,940**

FINANCIAL PROJECTION WITHOUT CARBON CREDITS

Project name		**EL BOTE**	
Type of project		Small Hydroelectric Plant	
Installed generating capacity		940 kw	interconnected to national grid
Net Head	112.5	meters	
Design Flow	1.05	m3/sec	
Availability of this flow	37%	(% exceedence on the flow duration curve of the site)	
Theoretical Annual Electricity output of this renewable energy source	5,800	Mwh/year	
Electricity generation lost due to defects in the grid of the neighboring distribution company	20%		
Net projected annual electricy generation	4,640	Mwh/year	
Consumption in the powerplant (lighting, ballast, etc.)	1.2	Mwh/year	
NET ANNUAL ENERGY OUTPUT	4,639		
Initial number of domestic customers, small businesses, offices, etc.	1,100	at end of 2006	
Average consumption	48.0	kwhrs / month 0.576 Mwh/year	
Annual growth rate projected	3.00%	based on population growth rate of the national statistics office: INEC 2000-2005	
Average peak demand per customer	250	watts	

Reduction of emissions of greenhouse gases:

relation of GGE :	Substitution of generation by isolated diesel plant	0.952	Ton CO_2/MWh
	Substitution of electricity from the National Electric Grid, Weighted average GGE	0.665	Ton CO_2/MWh
value :	US$ Reduction of emissions of Greenhouse Gases	$0.00	/ tonCO_2

		year 2004	2005	2006	2007	2008		
YEAR →		**0**	**1**	**2**	**3**	**4**	**5**	**6**
Generating Capacity of the Small Hydroelectric Plant and uses of the Energy :								
Net Annual energy output	Mwh/year				1,319.40	4,638.80	4,638.80	4,638.80
Sales in the Local grid (El Bote, El Cua and other communities)	Mwh/year				336.09	692.35	713.12	734.52
Energy losses in the local grid as a percentage of the energy sales	Mwh/year	20%			67.22	138.47	142.62	146.90
Excess energy available after covering the local demand	Mwh/year				916.09	3,807.98	3,783.05	3,757.38
Energy Losses in sale to the National Electric Grid	Mwh/year	5%			45.80	190.40	189.15	187.87
Sales to the National Grid	Mwh/year				870.28	3,617.58	3,593.90	3,569.51
Energy (required) when hydro plant is out of service for maintenance, resynchronization, water shortage, etc. [Purchase from DISNORTE]	Mwh/year	4%			34.81	144.70	143.76	142.78
Peak Hour Demand in the local grid	kw				291.7	300.5	309.5	318.8
TOTAL ANNUAL INCOME	**US$**				**129,759**	**391,389**	**394,141**	**396,975**
A. Sales of Electricity in the local grid	Mwh/year				**336.09**	**692.35**	**713.12**	**734.52**
Domestic customers, small businesses, offices, farms, etc.	quantity				1,167	1,202	1,238	1,275
Annual average energy billed (per customer)	Mwh	/customer			0.576	0.576	0.576	0.576
Income from Sales of electricity in the Local Grid	**US$**				**70,580**	**145,394**	**149,756**	**154,248**
B. Sales of Electricity to the National Grid	Mwh/year				**870**	**3,618**	**3,594**	**3,570**
Income from Sales of electricity to the National Grid	**US$**				**59,179**	**245,995**	**244,385**	**242,727**
C. Reduction of Emissions of Greenhouse Gases in sales to the National Grid		**Tons CO2**			**877**	**3,857**	**3,857**	**3,857**
Income for Reduction of Greenhouse Gases in sales to the National Grid		**US$**			**-**	**-**	**0**	**0**
TOTAL EXPENDITURES	**US$**				**329,201**	**323,023**	**381,077**	**381,071**
INVESTMENTS	1,889,743	**155,000**	**632,500**	**727,400**	**360,343**	**14,500**		
A. Engineering, Administration and general expenses								
Engineering	$ 33,481	9,000	9,000	9,000	6,481			
General Expenses	$ 55,597	4,000	5,000	28,000	18,597			
B. Civil Works of the Small Hydroelectric Plant								
Access Roads and Project Buildings	$ 52,501	25,000		24,400	3,101			
Construction of the Dam/Weir/Intake	$ 123,996	112,000	2,500	5,000	4,496			
Purchase and Installation of steel and PVC pipes	$ 288,838		115,000	165,000	8,838			
Construction of Powerhouse, tailrace canal and Operators' house	$ 121,500		30,000	85,000	6,500			
C. Electromechanical Equipment								
Purchase of Equipment	$ 733,630		450,000	270,000	13,630			
Instalation of Electromechanical Equipment	$ 120,500			70,000	50,500			
D. Indirect Costs (bank interest during construction, start-up capital)	$ 182,000		11,000	11,000	160,000			
E. Watershed conservation activities	$ 163,200	5,000	10,000	60,000	88,200			
F. Instalation of Metering Equipment in the El Bote hydro plant for CER sales	$ 14,500					14,500		
G. Operating costs					**179,201**	**205,730**	**205,678**	**205,624**
Operation & Maintenance costs					172,239	172,239	172,239	172,239
Cost of energy purchased when the El Bote plant is off line for repairs or maintenance					6,962	28,941	28,751	28,556
Overhaul of electromechanical equipment, El Bote, at 15 year intervals								
Costs of extending the electric grid and connecting new customers						4,551	4,688	4,828
Operating Balance					**-49,442**	**185,659**	**188,463**	**191,352**
H. Financial Costs					**150,000**	**117,121**	**175,367**	**175,367**
Principal					0	41,864	100,110	100,110
Interest					150,000	75,257	75,257	75,257
Loan Balance					1,301,465	1,259,600	1,159,490	1,059,380
I. Depreciation					**45,902**	**45,902**	**45,902**	**45,902**
Balance before Taxes					**-199,442**	**68,538**	**13,096**	**15,985**
J. Taxes					**0**	**171**	**33**	**80**
Income Tax (30%), waived during the first 7 years of operation of a hydroelectric plant	30%				0	0	0	0
Municipal Tax (1%), applied 0%, 25%, 50%, 75% & 100% during first 10 years	1%				0	171	33	80
Net Balance					**-199,442**	**68,366**	**13,064**	**15,905**
I. Depreciation					45,902	45,902	45,902	45,902
K. Residual Value								
CASH FLOW		**-588,313**	**0**	**0**	**-153,540**	**114,268**	**58,965**	**61,807**

Net Present Value	**$ (242,577)**
Internal Rate of Return	**7.9%**

FINANCIAL PROJECTION WITHOUT CARBON CREDITS

Tariff charged for electricity, local sales	$0.2100	/ kwh	Energy losses, local sales		25%
Sale Price of electricity, sales to National Grid	$0.0680	/ kwh	Energy losses, sales to National Grid		5%
Toll to Union Fenosa por use of 24.9 kv lines	$0.0000	/ kwh			
Toll use of high-voltage transmission lines	$0.0000	/ kwh	Price of electricity purchased from DISNORTE		$0.200 / kwh
Total Project Investment	$1,889,743				
Loan 68.9 %	$1,301,430				
Equity 31.1 %	$588,313				
			Annual depreciation		$45,902
Annual O&M costs (see Appendix E)	$ 172,239		Residual value of investment @ 20 years		$522,927
Cost of construction of local grid extensions	$ 130.00	/ new customer			
Life cycle *Civil Works*	50	years			
Electromechanical Equipment	25	years			
Interest rate of loan	5.5%		loan period	16	years
Discount rate	12.0%		grace period	3	years on the principal only

year													
7	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80	4,638.80
756.55	779.25	802.63	826.70	851.51	877.05	903.36	930.46	958.38	987.13	1,016.74	1,047.24	1,078.66	1,111.02
151.31	155.85	160.53	165.34	170.30	175.41	180.67	186.09	191.68	197.43	203.35	209.45	215.73	222.20
3,730.94	3,703.70	3,675.65	3,646.75	3,616.99	3,586.34	3,554.77	3,522.24	3,488.75	3,454.25	3,418.71	3,382.11	3,344.41	3,305.57
186.55	185.19	183.78	182.34	180.85	179.32	177.74	176.11	174.44	172.71	170.94	169.11	167.22	165.28
3,544.39	3,518.52	3,491.87	3,464.42	3,436.14	3,407.02	3,377.03	3,346.13	3,314.31	3,281.53	3,247.77	3,213.00	3,177.19	3,140.30
141.78	140.74	139.67	138.58	137.45	136.28	135.08	133.85	132.57	131.26	129.91	128.52	127.09	125.61
328.4	338.2	348.4	358.8	369.6	380.7	392.1	403.8	416.0	428.4	441.3	454.5	468.2	482.2
399,894	**402,901**	**405,998**	**409,188**	**412,474**	**415,858**	**419,344**	**422,934**	**426,632**	**430,441**	**434,364**	**438,405**	**442,568**	**446,855**
756.55	**779.25**	**802.63**	**826.70**	**851.51**	**877.05**	**903.36**	**930.46**	**958.38**	**987.13**	**1,016.74**	**1,047.24**	**1,078.66**	**1,111.02**
1,313	1,353	1,393	1,435	1,478	1,523	1,568	1,615	1,664	1,714	1,765	1,818	1,873	1,929
0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
158,876	**163,642**	**168,551**	**173,608**	**178,816**	**184,181**	**189,706**	**195,397**	**201,259**	**207,297**	**213,516**	**219,921**	**226,519**	**233,315**
3,544	**3,519**	**3,492**	**3,464**	**3,436**	**3,407**	**3,377**	**3,346**	**3,314**	**3,282**	**3,248**	**3,213**	**3,177**	**3,140**
241,019	**239,259**	**237,447**	**235,580**	**233,658**	**231,678**	**229,638**	**227,537**	**225,373**	**223,144**	**220,849**	**218,484**	**216,049**	**213,540**
3,857	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**	**3,857**
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
381,029	**380,987**	**380,943**	**389,428**	**390,465**	**391,461**	**392,583**	**393,649**	**394,746**	**395,876**	**551,185**	**277,236**	**278,472**	**279,744**
205,567	**205,510**	**205,450**	**205,389**	**205,326**	**205,261**	**205,194**	**205,125**	**205,053**	**204,980**	**454,905**	**204,827**	**204,747**	**204,665**
172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239	172,239
28,355	28,148	27,935	27,715	27,489	27,256	27,016	26,769	26,514	26,252	25,982	25,704	25,417	25,122
										250,000			
4,973	5,122	5,276	5,434	5,597	5,765	5,938	6,117	6,300	6,489	6,684	6,884	7,091	7,303
194,327	**197,392**	**200,548**	**203,799**	**207,148**	**210,598**	**214,150**	**217,810**	**221,579**	**225,461**	**-20,540**	**233,578**	**237,820**	**242,190**
175,367	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**175,367**	**96,280**	**0**	**0**	**0**
100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	100,110	58,280			
75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	75,257	38,000			
959,270	859,160	759,050	658,940	558,830	458,720	358,610	258,500	158,390	58,280	0	0	0	0
45,902	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**	**45,902**
18,960	**22,025**	**25,181**	**28,432**	**31,781**	**35,230**	**38,783**	**42,443**	**46,212**	**50,094**	**-116,820**	**233,578**	**237,820**	**242,190**
95	**110**	**126**	**8,672**	**9,773**	**10,833**	**12,023**	**13,157**	**14,326**	**15,529**	**0**	**72,409**	**73,724**	**75,079**
0	0	0	8,530	9,534	10,569	11,635	12,733	13,864	15,028	0	70,073	71,346	72,657
95	110	126	142	238	264	388	424	462	501	0	2,336	2,378	2,422
18,865	**21,914**	**25,055**	**19,761**	**22,008**	**24,397**	**26,760**	**29,285**	**31,886**	**34,565**	**-116,820**	**161,169**	**164,096**	**167,111**
45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902	45,902
													522,927
64,767	**67,816**	**70,957**	**65,662**	**67,910**	**70,299**	**72,662**	**75,187**	**77,788**	**80,467**	**-70,919**	**207,071**	**209,998**	**735,940**

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

ACTA DE LAS ASAMBLEAS COMUNITARIAS SOBRE EL MECANISMO DE DESARROLLO LIMPIO

Reunidos el día 17 de abril de 2008, en el municipio de El Cuá, departamento de Jinotega, Republica de Nicaragua; se procede a explicar por parte de ATDER-BL la pretensión de obtener Reducciones Certificadas de Emisiones del Proyecto Mini-Central Hidroeléctrica y Electrificación Rural El Bote, de manera que su venta ayude al pago del crédito que se debe al Banco Mundial, a través de la Financiera Nicaragüense de Inversiones (FNI) como intermediario financiero, así como para gestionar recursos para la conservación de la cuenca hidrográfica de El Bote, además para gestionar recursos económicos para procurar extender el servicio a más familias que lo están demandando.

Se explica que existe un consenso internacional sobre los perjuicios que el cambio climático está produciendo, fundamentalmente debido a la emisión de gases de efecto invernadero. Ese consenso está materializado con la firma del Protocolo de Kioto y acuerdos internacionales posteriores, pero que simplificamos nombrando al primero sólo.

Unos de esos gases es el Dióxido de Carbono, CO_2 es su fórmula química. Con la ejecución del Proyecto se dejó de emitir el CO_2 que la planta Diesel aislada de El Cuá estaba produciendo. Igualmente ha facilitado la electrificación de una parte de el municipio y la interconexión con Bocay y la red nacional. Esa interconexión permite inyectar energía renovable a la red nacional de Nicaragua mientras nuestro municipio crece y así contribuimos a reducir la dependencia del petróleo.

En el Protocolo de Kioto se establecen obligaciones y acciones que los países firmantes deben cumplir para frenar la emisión a la atmósfera de gases de efecto invernadero. Los países más industrializados y con economías más fuertes y que son los que más contaminan, tienen que reducir las emisiones de gases. El Protocolo de Kioto establece unos mecanismos, uno de ellos es el Mecanismo de Desarrollo Limpio (MDL) mediante el cual un país de economía desarrollada puede apoyar financieramente alguna iniciativa que reduzca la contaminación por gases de efecto invernadero que se dé o pueda dar en un país menos desarrollado. El país industrializado obtiene ese reconocimiento mediante la compra de unos documentos con respaldo internacional llamados Reducciones Certificadas de Emisiones (RCEs), que coloquialmente se le llama Bonos de Carbono, Créditos de Carbono o Carbono.

La ATDER-BL quiere obtener esas RCEs ya que contribuirán al re-pago de la deuda contraida para las inversiones realizadas en la construcción de la planta hidroeléctrica de El Bote y las líneas eléctricas del proyecto.

Estamos procediendo por ello a presentar esta propuesta para información pública, para que los colectivos o personas individuales expresen libremente su aceptación o rechazo, así como las preguntas y aclaraciones que se requieran. A

1

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

su vez se informa que esta iniciativa está pilotando la primera experiencia de un proyecto de interés social en validar y certificar Carbono en la República de Nicaragua, con el aval de la Oficina Nacional de Desarrollo Limpio (ONDL) del MARENA y la Municipalidad de El Cuá. De esta manera queremos participar para que Nicaragua aproveche sus propios recursos energéticos renovables y se amplie la cobertura en la electrificación rural, tan demandada en las áreas rurales como las nuestras, donde finalmente vamos a disfrutar de energía para mejorar nuestras condiciones de vida y posibilitar otras alternativas socio-económicas para la población campesina.

Manifestamos que la electrificación es una necesidad, y vemos muy positivamente el apoyo del MDL para que nuestras propias fuentes renovables nos abastezcan y a la vez como organizaciones sociales de base y comunidades rurales, que la venta de la energía que nos sobra nos ayude a financiar, sostener y mantener nuestros proyectos.

Desarrollo de la sesión:
P = pregunta, R = respuesta, C = comentario

Introducción: ATDER-BL presentó una breve descripción del proyecto hidroeléctrico de El Bote y el estado actual del proyecto. La planta está operando desde Noviembre 2007. Se están ampliando las redes eléctricas para llevar la electrificación a otras comunidades del municipio.

Comentarios, preguntas y respuestas:

P: FDL: ¿Que beneficios va obtener una persona que tenga un bosque en su finca?
R: En caso de las fincas ubicadas en la cuenca hidrográfica de la planta de El Bote, ATDER-BL y un comité local ya han establecido un programa de manejo sostenible de la cuenca, que ayuda a las familias en cultivos de café y cacao, un banco de semilla de frijól, conservación de suelos, etc.

P: Anibal Gonzáles: ¿Existe un diagnostico sobre que cantidad de dioxido de carbono que evita de emitir el municipio del Cua por medio de los bosques que aquí existen? ¿Como se pagaría?
R: La gestión actual trata del CO_2 que se evita de emitir a la atmósfera porque se está sustituyendo generación de electricidad con energía hídrica en lugar de petroleo. El oxígeno que producen las grandes extensiones de bosques del municipio de El Cuá es otro beneficio ambiental. No conocemos que este recurso haya sido valorado bajo la perspectiva de la no-emisión de CO_2

P: ¿Se podria calificar el municipio de El Cua como no emisor de dioxido de carbono?
R: Es posible, pero sería otra gestión, no la gestión actual.

P: Sra. GLORIA CHAVARRIA: ¿Cuanto dinero aporta Belgica? ¿Cuanto dura el convenio?
R. El contrato puede ser por aproximandamente 10 años, falta aún negociar estos aspectos del Contrato de venta de los RCE's de la planta hidroeléctrica de El Bote.

2

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

P. ¿En que se invertiría los fondos por la venta de los RCE's despues de haber pagado la deuda con el banco?

R: Se estarian invirtiendo en la ampliacion de las redes eléctricas hacia las comunidades que actualmente no cuentan con ese servicio, y para ampliar el programa de manejo sostenible de la cuenca hidrográfica en El Bote.

P: FDL: ¿Porque el Proyecto de la planta de El Bote esta retrasado en los pagos con el banco?

R: Existen varios factores, uno es el retraso en el inicio de operación de la planta de El Bote por problemas tecnicos en los equipos. Hubo retraso de parte del INE en la aprobación del contrato por lo cual ATDER-BL vende la energía excedente de la planta de El Bote a Unión Fenosa. Existe un problema aún no resuelto respecto a los costos de compra y venta de energía entre ATDER-BL y Unión Fenosa debido a lagunas en las leyes que rigen en el Sector Eléctrico de Nicaragua. Unión Fenosa tiene muchas fallas en sus líneas eléctricas que bloquean una parte de la energía que la planta de El Bote podría estar inyectando a la red nacional

P: ¿Hasta cuando se piensa dar solucion a los problemas con Union Fenosa?

R: Estamos intentando resolver los problemas legales relacionados con los Contratos de compra/venta actualmente a través del INE y el Ministerio de Energía y Minas. Los problemas de las interrupciones con la interconexión de redes los estamos negociando en la medida que sea posible con la empresa Unión Fenosa. Ha habido ciertos avances y mejorías en los problemas de la interconexión de redes durante los últimos 4 meses

P: MINSA: ¿Cuales son los beneficios que van a obtener las comunidades?

R: Servicio de electricidad, ampliación de las redes eléctricas, apoyo a los habitantes de la cuenca hidrográfica en su agricultura y conservación de suelos.

C: Gloria Chavarría: Propone que los señores que compran los RCEs deberían venirse y explicar personalmente el precio que ponen a los RCEs ya que a ella le parece que el valor de proteger el medio ambiente vale mas de lo que pretenden pagar por los RCEs.

C: FDL: Estamos como FDL impulsando un proyecto para la venta de oxigeno, se esta negociando los precios para la venta. Los paises desarrollados necesitan mas que nosotros evitar la contaminacion del medio ambiente. Aquí hay poca contaminación comparado con los países desarrollados

C: Anibal Gonzalez: propone que se haga un proyecto de venta de oxígeno a nivel nacional.

C: Padre Fco. Antonio Sandoval, Iglesia Católica: Los bosques y los ríos, y por ende los recursos para la generación limpia de electricidad, son patrimonio del Municipio de El Cuá, y todos los habitantes. En este caso, respecto a la planta hidroeléctrica de el Bote, ATDER-BL representa a la población en general del municipio para la venta de los RCEs.

P: Elsa Marina Venavidez, Consejal: ¿Esta comercialización de los RCEs de la planta hidroeléctrica de El Bote perjudicaría una futura iniciativa de venta de oxigeno del municipio?

R: No perjudicaría.

3

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

Firmamos en representación de las Comunidades y las Organizaciones de Base, Alcaldía, Consejos de Participación Ciudadana, Cooperativa. . . . . y ATDER-BL las siguientes personas:

ORGANIZACIÖN	NOMBRE	FIRMA
MINED	Fátima del R. Martínez	
MINSA	Luis Alonso Castillo	
Cord. S.S.19 Julio	Marlene Gadea	
Sindicato de maestros	José Alfredo Duarte Rodríguez	
PODER CIUDADANO	JUAN RAMON LOPEZ	
Secretaria Poder C	Glenys Damaris M	
Delegado P.C.	Anibal Daniel	
Iglesia Católica	Francisco Antonio Sandoval Gaitan	
Concejal	Elsa M. Benavidez	
	Gloria Rivera Ch.	

4

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

F.D.L	Aquileo Maradiaga		
Jose Angel Rizo A.	Secretario, ASOLPIC		La pita
Magdalia L. Valdivia Centeno	Ama de casa		La pita
Silvio Isaías Torres Lira	Profesor		La pita
Aux. Alcalde	Dionisio Mendoza		La pita
MINSA	Eduardo J. Rodríguez		La pita
MITRAD	Paolo Espinoza		La pita
MINED	Rosa D. Rizo A.	Rosa D. Rizo A.	La pita
MINED	Iveth Picado		
MINED	Jessenia Castro V		
MINED	Arelys López M	Arelys López	
Asolpic	José Antonio González G.		

5

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

MINED	Oscar Herrera Lumbi	
Productor	Justo Cruz	J.C.C.A
ASOLPIC.	Isidoro Zelaya	
MINED	Verónica López Herrera	
MINED.	Raquel	Raquel
MINED.	Flor yesenia Herrera.	
Comerciante.	Lucila Altamirano L.A.L.	
Comerciante Victoria Arteaga	Victoria Arteaga	comerciante
Productor	Roberto R	R R G
Promotor Rural MAGFOR.	Armando Jose Lorente	
coordinador asonpope	Melitonio G.M.	

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

Marena	Marlon Gutierrez Rico		El cua
comerciante	Roberto RODRIGUEZ		El cua
Comerciante	Elena Arteaga		El cua
Estudiante	Héctor Herrera		El cua
MINED	Yadira A. Gurdian		El cua
MINED	Eddy Alvarado B.		
Comercianta	María Lidia Villegas.		
MINED	Manuel Alvarado G		
Odontologia	Jaime Martinez		
Productor	pedro Altamirano	P C A Nueva del	
Comerciante	María lidia Altamirano		

ACTA DE ASAMBLEA COMUNITARIA SOBRE EL MECANISMO DE DESARROLLO LIMPIO

Alfonso Tenez Trujillo Abisinia

ama de casa	Bocaysito	Glady Alvarado.
Secretaria	Glenys Aguilar. El cua	
Comerciante	El cua	
Dependienta	El cua	
Dependienta	Damarily Aguilar	El cua.
Estudiante	Darlyng Meza A.	
ama de Casa	Juana M Altamirano	J. M. A.
Productor	Fredeman Meza	
Loeth Vibina.	Secretaria.	
ama de casa	Damaris Castillo	

8

Gobierno de Reconciliación y Unidad Nacional

El Pueblo, Presidente!

Despacho de la Ministra

Managua, 05 de Septiembre del 2008.-
Ref.: DM.JAS/0916.09.08-

Mr.
Rajesh Kumar Sethi
President Exucitive Board
Clean Development Mechinism

Referenc: Government Endorsement for El Bote Small Hydroelectric Plan and Rural Electrication Project.

Dear Mr. Sethi:

I have the honor to inform you that the Clean Development National Office (Oficina Nacional de Desarrollo Limpio) of the Ministry for low of the Environment and Natural Resources of Nicaragua (MARENA), as the Designed National Authority (DNA) for Kyoto Protocol, endorses the "El Bote Small Hydroelectric Plan and Rural Electrication Project." and give the required approval for it to Claim certificated emission reductions.

The Nicaragua Government having signed and ratified the Kyoto Protocol and designed the ONDL as its Designed National Authority, though the present letter approves the voluntary participations of this project for the purposes form the article 12 from the Kyoto Protocol.

The ONDL, after reviewing the Project Design Document (PDD) and finding that the project contributes to the Sustainable Development of the Country and complies with national legislation, expresses its willingness to cooperate with the Clean Development Mechanism (CDM) in all the processes that lead to emission and transfer of the certificated emission reductions resulting from them.

Though this communication the Government of Nicaragua expresses its support for the transfer of certified emissions reductions that result from this project.

I express my willingness to provide further information about this project and my respect for you.

Sincerely yours,

MINISTERIO DEL AMBIENTE Y LOS RECURSOS NATURALES
MINISTRA
MARENA

Juanita Argeñal Sandoval
Ministry of Environment and Natural Resources

Cc. Clean Development National Office (ONDL)
Archive

PODER CIUDADANO
Nicaragua para con Vos!

Ministerio del Ambiente y los Recursos Naturales
Km. 12 ½ carretera norte Frente a Corporación de Zonas Francas
Apartado Postal 5123, Managua, Nicaragua
Tel: (505) 263-1273 – 263-1667 Fax (505) 263-1274
E.mail: jargenal@marena.gob.ni

Gobierno de Reconciliación
y Unidad Nacional
El Pueblo, Presidente!

Despacho de la Ministra

Managua, Nicaragua, Agust 28, 2009.-
MARENA-DM-JAS/1437.08.2009.-

Mr.
Rajesh Kumar Sethi
President Executive Board
Clean Development Mechinism

Ref: Clarification of Name of Project

Dear Mr. Sethi:

We hereby clarify that, for all legal and administrative purposes related to the Clean Development Mechanism and sale of Carbon Emission Reductions:

The project that consists of the construction of a small hydroelectric plant of 900 kw capacity, and construction of primary and secondary electric grids to distribute the clean energy to the communities located in the local Concesion area, carried out by the Association ***ATDER-BL****, in the municipality of El Cuá of the Department of Jinotega during the period 1999 – 2008, can be referred to with equal validity as:*

1. *Small Hydroelectric Plant and Rural Electrification Project – El Bote*
2. *Small Hydroelectric Plant El Bote and Rural Electrification Project*
3. *El Bote Hydroelectric Project*
4. *El Bote Small Hydroelectric Plant*

We hereby clarify that all of these terms refer to the same project.

Juanita Argeñal Sandoval
Ministry of Environment and Natural Resources

Cc. *Roberto Araquistain, Deputy of Environment and Natural Resources*
Gilberto Paez, General Secretary
Martha Elena Ruiz, Directorate General of climate change
File.-

*/jr****

PODER CIUDADANO
Nicaragua Gana con Vos!

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Km. 12 ½ carretera norte Frente a Corporación de Zonas Francas
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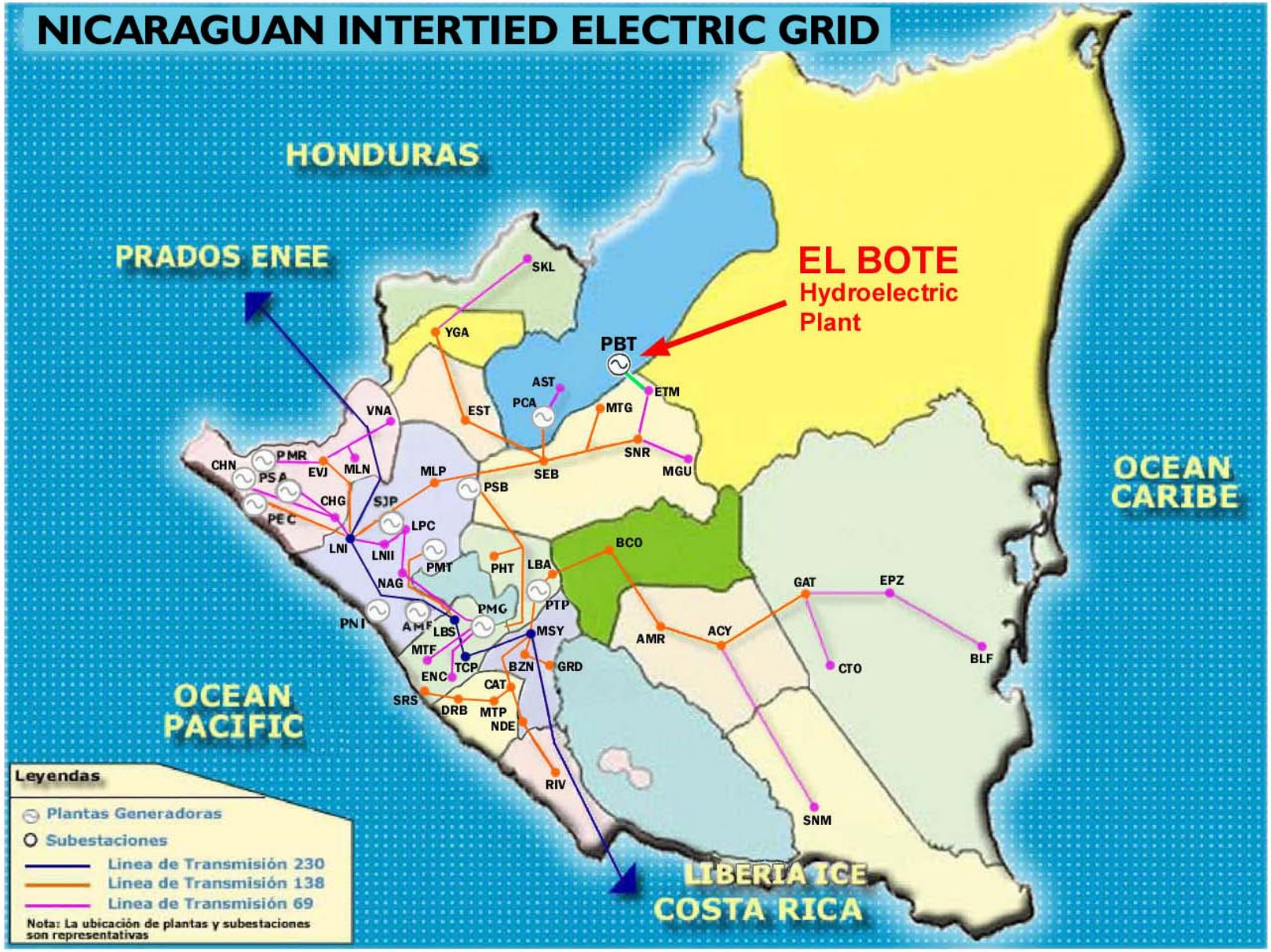
E.mail: jargenal@marena.gob.ni



Annex 6 : Map of Nicaraguan Electric Grid

Annex 7

EVIDENCE OF EARLY IDENTIFICATION AS A CDM PROJECT

CDM Prior Consideration

The El Bote small hydroelectric project was identified as a CDM project by the sponsor (ATDER-BL) and by the National Office of the Clean Development Mechanism (ONDL) of the Nicaraguan Ministry of Environment and Natural Resources (MARENA) as early as the year 1999, when ATDER-BL initiated the design of the small hydroelectric plant. ATDER-BL from that time forward participated in workshops on CDM, proceeded to write up the Project Idea Note, and prepared other requirements for sale of the Carbon Emission Reductions. However, due to the small size of the project and difficulty experienced in obtaining the financial resources for its construction, ATDER-BL did not have money available to pay a DOE for the services of consultancy related to the PDD, nor for the Validation and Registration of the project, until the year 2009.

The following evidence of early identification of the El Bote Small Hydroelectric project as a CDM project has been presented to the DOE:

February 11, 2001: e-mail from ATDER-BL to Wiwili Project: Announcement of approval by Finland government of proposal of baseline and PDD studies for hydroelectric projects in Cuá-Bocay.

March 5, 2001: e-mail from ATDER-BL to CNE, submitting preliminary calculations of CER's.

March 12, 2001: Communication from Cuá-Bocay municipality to Instituto Nicaraguense de Electricidad. The municipality agree ATDR-BL obtain the concession for electricity services in the zone.

October 26, 2001: e-mail announcing official endorsement letter for the Finland government and PDD elaboration TOR's.

November 7, 2001: e-mail from Department for International Development Cooperation, Finland government to ATDER-BL submitting the Terms of Reference for preparation of the Project Design Document (PDD) of the Cua-Bocay hydroelectric project.

November 7, 2001: e-mail from ATDER-BL inviting to the capacitating event on "GEF/FMAM" funds and carbon by PNUD.

May 10, 2004: ECO SECURITIES: UNITED NATIONS DEVELOPMENT PROGRAMME – LEARNING BY DOING CDM CAPACITY BUILDING INICIATIVE Completion Document for the El Bote-Bocay-La Pita Pilot Project in Nicaragua

November 25, 2004: El Cuá municipality endorsements financing procurement actions by ATDER-BL to build electricity services supply from El Bote hydroelectric project.

December 1, 2004: El Cedro, Cuá Municipality ask to ATDER-BL inclusion of this population in the electrification program from the El Bote Hydroelectric project.

December 10, 2007: El Cuá municipality endorsements of actions by ATDER-BL seeking CDM achievement by the El Bote Hydroelectric project.

Three official communications follow, that indicate early identification of this project as a CDM project, with translations to English after each original (the original letters are in Spanish).

12-15-99 08:23 505 233 4690 CAMBIO CLIMATICO 001

Ministerio del Ambiente y los Recursos Naturales
MARENA

Programa Ambiental Nicaragua - Finlandia
Programa Apoyo a la Implementación de la Convención Marco sobre Cambios Climáticos

Managua, 13 de Diciembre de 1999.

Ingeniera
Rebecca Leaf
Directora
ATDER-BI.
Su despacho.

Estimada Ingeniera Leaf:

Tengo el gusto de dirigirme a su digno medio, con relación a la jornada realizada el pasado 2 de Diciembre del corriente año, para la selección de ideas de Proyectos de Mecanismo de Desarrollo Limpio en el sector energético efectuada en el Ministerio del Ambiente y los Recursos Naturales.

En este sentido, la Institución que represento después de haber conocido de la idea del Proyecto que Ud presentó (Generación eléctrica con minicentrales hidroeléctricas y gestión comunitaria en la zona rural), decidió comunicarle a través del suscrito que esta propuesta ha sido seleccionada dentro de las tres principales propuestas para pasar a la segunda fase de redacción. Para este fin, tomaremos contacto con Ustedes en los próximos días para definir el programa de trabajo.

Agradezco a Usted y a los consultores asociados, la fina atención de haber participado, esperando poder proceder al diseño conjuntamente de la propuesta a la mayor brevedad.

Atentamente,

Mario Torres Lezama.
Director

PROGRAMA AMBIENTAL NICARAGUA - FINLANDIA * MARENA * Cambios Climáticos *

CC: Lic. Carlos Rivas — Dir. Gral. Biodiversidad
Kari Ahti — ATP
Archivo (proyectos MDL)

Km. 12 ½ Carretera Norte, Apto Postal 5123. Telefax. 00-(505)-263-2596 Fax. 2631274 - 263 2866.
Managua, Nicaragua

Translation of letter from Mario Torres Lezama, Director of Climate Change department of the Ministry of the Environment and Natural Resources (MARENA). Note that this department of MARENA later formed the CDM Authority of Nicaragua known by the initials ONDL (Oficina Nacional de Desarrollo Limpio). The formation of the ONDL (CDM Authority) in Nicaragua in the year 2000 was sponsored by the government of Finland via the Partnership in Energy and Environment (Finland/Central America) in accordance with commitments signed following the Kyoto Protocol:

Managua, 13th of December 1999

to: Rebecca Leaf
Director ATDER-BL

Dear Engineer Leaf:

It is my pleasure to write you about the work session of 2nd December regarding selection of ideas for Projects of the Clean Development Mechanism in the energy sector, carried out by the Ministry of Environment and Natural Resources (MARENA).

The institution that I represent, after being informed of the idea of the project that you presented (electricity generation with small hydroelectric plants and community management in the rural areas), decided to notify you that this proposal has been selected among the three principal proposals to pass to the second phase of document preparation. To this end, we will be in contact with you in the very near future to define a work schedule.

I thank you and associated consultants for having participated in the presentation of projects, and hope to proceed with the project design as soon as possible.

Sincerely,

Mario Torres Lezama
Director
Climate Change department
Ministry of Environment and Natural Resources

Note that ATDER-BL with the El Bote hydroelectric project participated in the competition organized by the incipient CDM Authority of Nicaragua, with other Nicaraguan renewable energy projects, and won the prize which was $7,000 of support for preparing the formal feasibility study fo the El Bote project. The identification of the El Bote hydroelectric project as a CDM project, and the possibility of obtaining Carbon Credits for the project has been pursued since this date: **December 1999**.

11-28-03 13:51 505 263 2596 CAMBIO CLIMATICO 001

Ministerio del Ambiente y los Recursos Naturales
MARENA
Proyecto Oficina de Desarrollo Limpio y Cambio Climático
PNUD-NIC/01/008-MARENA

Managua, 27 de Noviembre del 2003
Ref. PNUD/NIC/01/008/27/11/03-0373

Señora
Sirpa Maempáa
Encargada de Negocios
Embajada de Finlandia
Su Despacho

Estimada Señora Maempáa:

Tengo el agrado de dirigirme a usted en ocasión de hacer de su conocimiento que el Proyecto hidroeléctrico denominado "El Bote" esta recibiendo todo el apoyo del Ministerio del Ambiente y Recursos Naturales, a través de la Oficina Nacional de Desarrollo Limpio, ya que el mismo es un proyecto de electrificación rural que beneficiará a muchas familias del Norte de Nicaragua.

Dicho proyecto esta siendo analizado para ser utilizado como piloto por el PNUD regional para probar una guía metodológica de para la elaboración proyectos de pequeña escala que aplicaran al Mecanismo de Desarrollo Limpio.

Este proyecto estará recibiendo apoyo de la Alianza de Energía y Medio Ambiente entre Centro América / Finlandia, sin embargo aún no logra consolidar su financiamiento, por lo que mucho se agradecerá cualquier apoyo adicional que pudiera otorgarle el Gobierno de Finlandia para este fin.

Al agradecerle de antemano la atención que brinde a la presente, le reitero las muestras de mi mas alta consideración y estima.

Marina Stadthagen
Directora

OFICINA NACIONAL DE DESARROLLO LIMPIO ONDL MARENA PROY. PNUD/NIC./01/008

Cc: Sra. Kaj Buss, Vicepresidente ABB
Sra. Rebeca Leaf, ATDER
Archivo

Km. 12 ½ Carretera Norte, Apto Postal 5123. Telefax: 233-1868 / 2632596.
Managua, Nicaragua

CDM – Executive Board

Translation of letter from Marina Stadthagen, Director of ONDL (Oficina Nacional de Desarrollo Limpio), which is the CDM Authority of Nicaragua, located within the Climate Change department of the Ministry of the Environment and Natural Resources (MARENA) of Nicaragua.

27 November 2003

to: Ms. Sirpa Maempáa
Embassy of Finland
Managua, Nicaragua

Dear Ms.Maempáa:

It is my pleasure to inform you that the hydrolectric Project called “El Bote” is receiving full support from the Ministry of Environment and Natural Resources, via the Clean Development Mechanism Office, since this is a rural electrification project that will benefit many families in the North of Nicaragua.

This project is being analyzed to be used as a pilot project by the Regional UNDP (United Nations Development Programme) to test a methodology guide for the preparation of small scale projects that apply for the Clean Development Mechanism.

This project will receive support from the Energy and Environment Partnership of Central America and Finland, none-the-less it still has not been able to consolidate full financing, hence would be very grateful for any additional support that could be assigned by the Government of Finland.

Thanking you for your kind attention,

Marina Stadthagen
Director
Clean Development Mechanism Office
Climate Change Department, MARENA

Programa de las Naciones Unidas para el Desarrollo

PNUD Nicaragua

REF: NIC/02/G31 - UNDP-2009-0429

21 de Mayo de 2009

CONSTANCIA

En los años 2003-2004 el Programa de las Naciones Unidas para el Desarrollo (PNUD) de Nicaragua, en conjunto con la oficina ONDL de MARENA (Ministerio de Recursos Naturales y Ambiente de Nicaragua) realizó una labor de capacitación con el propósito de fortalecer a los proyectos de energías renovables en nuestro país, a desarrollar la capacidad de gestionar la venta de CER's para ayudar con el financiamiento de sus proyectos.

La metodología de la capacitación fue la realización de un "Estudio de Caso" de uno de los proyectos de energía renovable en Nicaragua. El proyecto seleccionado fue la Mini-Central Hidroeléctrica de **El Bote**. Con el acuerdo del desarrollador de este proyecto (**ATDER-BL**), se procedió a recopilar la información pertinente y a realizar ejercicios de revisión de la Línea Base y preparación del PIN del proyecto, realizando también varios encuentros con el personal de otros proyectos de energía renovable, de manera didáctica, para explicarles los pasos del proceso que se sigue para llegar a validar, registrar, certificar y monitorear CER's conforme la metodología del Mecanismo de Desarrollo Limpio.

El Ente Operativo EcoSecurities participó como consultor en este proceso, e impartió los talleres de capacitación sobre el MDL. Se llegó hasta la etapa de preparación de un PIN, y la valoración de una Línea de Base para el proyecto hidroeléctrico El Bote, combinado con dos proyectos hidroeléctricos previos de ATDER-BL en la misma zona, de menor capacidad, que se llaman "Bocay" y "La Pita" cuyos CER's se pensaban incluir y comercializar junto con los CERs de la planta hidroeléctrica "El Bote" (900 kw capacidad).

Adjuntamos el informe final del proceso de capacitación preparado por EcoSecurities como evidencia de las actividades de capacitación y análisis realizadas, y las recomendaciones a ATDER-BL para seguir con la Validación y Registro de los CER's de la hidroeléctrica El Bote.

Es de nuestro conocimiento que **ATDER-BL** querría, e incluso necesitaba, comercializar los CERs del proyecto hidroeléctrico **El Bote** para complementar el paquete de financiamiento de dicho proyecto, pero no pudieron terminar el PDD del proyecto ni proceder con la Validación y Registro formal de sus CERs, porque el proyecto es muy pequeño y no disponían de los fondos necesarios para pagar los servicios de consultoría a un Ente Operativo en aquella época (2003-2004).

Dado en Managua a los 21 días del mes de Mayo del año 2009

Claudio Tomasi
Representante Residente Adjunto

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Translation of certification letter from Claudio Tomasi, Resident Representative of the UNDP in Nicaragua

CERTIFICATION

During the years 2003-2004 the United Nations Development Programme in Nicaragua, in conjunction with the ONDL (Oficina de Desarrollo Limpio, the CDM Authority) of the Ministry of Environment and Natural Resources of Nicaragua, carried out a training initiative with the purpose of strengthening the renewable energy projects of our country, to develop the capacity to sell CERs to complement the financing of their projects.

The methodology of the training was the carrying out of a "Case Study" of one of the Nicaraguan renewable energy projects. The selected project was the small hydroelectric plant EL BOTE. With the agreement of the developper (ATDER-BL) we proceeded to collect the pertinent information and carry out the excercises of review of the Base Line and preparation of the PIN of the project, organizing at the same time several workshops with the personnel of other renewable energy projects in a didactic manner to explain the steps of the process for validating, registering, certifying and monitoring CERs according to the methodology of the Clean Development Mechanism.

The Operational Entity EcoSecurities participated as consultant in thie process, and imparted the training workshops about the Clean Development Mechanism. The stages were reached of preparing the PIN and the evaluation of a Base Line for the El Bote hydroelectric project, combined with two previous hydroelectric projects of ATDER-BL in the same area but of smaller generating capacity known as "Bocay" and "La Pita" whose CERs it was thought could be included and comercialized together with the CERs from El Bote.

We attest that ATDER-BL wanted, and even needed, to comercialize the CERs of the El Bote hydroelectric project to complement the financing of the project, but they were not able to finish the PDD of the project nor proceed with the Validation and Registration of their CERs because the project is very small and they did not have the funds necessary for paying the services of consultancy to an Operational Entity at that time (2003-2004).

Signed in Managua on the 21st of May 2009

Claudio Tomasi
Resident Representative
UNDP - Nicaragua