PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	EOLO Wind Power Project
Version number of the PDD	Version 3
Completion date of the PDD	25/03/2014
Project participant(s)	1. EOLONICA, S.A.- Sucursal Nicaragua 2. Eolo de Nicaragua S.A.
Host Party(ies)	Nicaragua
Sectoral scope and selected methodology(ies)	Sectoral scope: 1 – Energy industries (renewable/non-renewable sources). Project type: Renewable Energy “ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.3.0 – 2 March 2012)”
Estimated amount of annual average GHG emission reductions	110,054 tonnes of CO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Eolo Wind Power Project involves using renewable wind power to provide affordable electrical energy to Nicaragua´s grid. The total capacity of the project is 44 MW, which consists in installing twenty-two 2 megawatt (MW) Gamesa G90 wind turbines generators. The net power production delivered to the national grid is estimated to be 162.32 GWh per year. The wind farm is located on the southwest coast of Lake Nicaragua or Cocibolca, in the Department of Rivas, Republic of Nicaragua.

The main objectives of this project are:

- Provide power to the growing requirement of electricity in Nicaragua, using sustainable and competitive wind resource.
- Promote the development of alternative energy sources through cleaner technologies for the environment.
- Reduce dependence on power generation in the country by means of fossil fuels, replacing them with renewable resources.

Nicaragua's grid (namely, National Interconnected System,"NIS") consists mainly of thermal power plants. In 2010, 64% of the grid's capacity depended directly on the combustion of either fuel oil or diesel. Likewise, 65.3% of the NIS generation was provided by thermal plants using fossil fuels in the same year. In contrast, the percentages for generation from renewable energy sources were significantly smaller: 15% for hydro, 8.1% for geothermal, 6.8% for biomass and 4.8% wind energy. The NIS has an estimated emission factor of 0.6780 tCO_2e per megawatt hour, which implies that the project will be able to displace more than 113 thousand tonnes of carbon dioxide per year. This will occur since the availability of a cheaper source of electricity will allow the NIS to reduce the amount of generation required from more expensive fossil fuel plants. The reduction of generation from thermal plants burning fuel oil or diesel in favor of generation from a renewable source will reduce CO_2 emissions to the atmosphere arising from the former.

Eolo de Nicaragua S. A. ("Eolo"), a special purpose vehicle established in Nicaragua, is the original company formed to develop of the EOLO Wind Power Project.

EOLONICA, S.A., a special purpose Panamanian vehicle operating in Nicaragua through a Nicaraguan branch (EOLONICA, S.A. – Sucursal Nicaragua), has been established by ARCTAS Capital Group LP, to help develop the project. Arctas is a U.S. company and through EOLONICA, S.A. develops energy projects in the region, with interests in the development and acquisition, structuring, financing and managing a wide range of energy infrastructure, including clean energy projects and renewable energy. Arctas directors have over 20 years of experience in the energy sector with projects around the world. In Nicaragua they have experience in developing, funding and commissioning of the wind projects Amayo I and II.

Contribution to sustainable development

- Reduction in electricity costs: The project will produce significant savings in respect to electricity costs, offering one of the cheapest sources of energy in the country. The average

power plant in Nicaragua costs the Nicaraguan people approximately $172 per megawatt hour[1], while the Eolo wind farm will have an initial cost of $104.50 per megawatt hour[2] for savings of nearly $67.50 per megawatt hour. This will help make Nicaraguan industries be more competitive and electricity be more affordable to the Nicaraguan people.

- Increase in power supply in a country with energy deficit: The project will have an installed capacity of 44 megawatts, which will increase the supply of electricity.

- Reduce reliance on fossil fuel technologies: The project will reduce Nicaragua's dependence on expensive deteriorated fossil fuel fired power plants that are unreliable and significantly more expensive to operate.

- GHG emissions reduction: The Eolo wind power project is in accordance with the objectives of Nicaragua's "Plan of National Action against Climate Change" (in Spanish, "Plan de Acción Nacional para enfrentar al Cambio Climático"). This is because the proposed project activity will be generating electricity from a clean source, displacing generation from carbon-intensive technologies in the grid.

- Employment generation: During the construction phase, approximately 175 to 200 Nicaraguans will be employed. Once the plant becomes operational, approximately twenty permanent jobs will be established.

- Reduction of oil imports: The use of indigenous renewable energy sources will help reduce Nicaraguan consumption of imported fuel oil, thereby reducing current fuel purchases expenditures. This will enhance Nicaragua's balance of trade and strengthen the country's currency.

A.2. Location of project activity

The project is located in the province of Rivas, approximately 123 km south of Managua.

A.2.1. Host Party(ies)

Nicaragua

A.2.2. Region/State/Province etc.

Rivas

A.2.3. City/Town/Community etc.

Rivas

A.2.4. Physical/Geographical location

The project is located at approximately mile 123 along the Pan-American Highway. The site is ideally located on the south west coast of the Lake of Nicaragua, where there is a very narrow range of wind directions through which a vast majority of wind energy would be produced.

[1] The average price presented is the spot market price (June-2011). Source: http://www.cndc.org.ni (excel spread sheet with calculations is available to the DOE)
[2] As stated in the PPA.

The area for the implementation of the wind farm is centered at the geographical coordinates (UTM) 1256863 (north latitude) and 0636020 (east longitude).

Figure 1- Project Location

A.3. Technologies and/or measures

Baseline and scenario existing prior to the start of the implementation of the project activity.

The baseline scenario consists of the electricity that would have otherwise been generated by the operation of the rest of the grid-connected power plants and by the addition of new generation sources, excluding the Eolo Wind Farm. This baseline scenario presents that fossil fuel power plants are the dominant technology in the Nicaraguan grid.

The Nicaraguan Interconnected System (NIS) overall capacity is 1,060 MW. In 2010, the grid generated around 3,321 GWh (net generation), of which 65.3% was produced using fossil fuels (bunker & diesel), 15% from hydro power plants, 8.1% from geothermal steam, 6.8% from biomass and 4.8% from wind farms.

Capacity additions to the Nicaraguan grid over the last five years were fossil fuels power plants (79%) and wind farms (21%), both under private investments. However, wind energy is an on-going development in this country, and presently there are only two existing wind power plants, both dependant on the CDM.

Activities to be implemented by the project

By delivering its output to the Nicaraguan national grid, the proposed project will reduce CO2 emissions from the fossil fuelled plants displaced in the later (full list of emission sources and gases involved is presented on Section B.3 below).

The layout of the Eolo wind farm location has the main elements of a wind farm: wind turbines, wind measuring stations, a control house and an electrical substation. The location also has clear access to the roads, transmission lines, and the shore of Lake Nicaragua.

For approximately eight years, wind measurements have been taken in two different points of the Amayo site, which is about five kilometers south of where the Eolo wind mill park will be located. Each tower located on the Amayo site has shown that the annual wind average is 7.5 meters per second on the west side of the park (at a height of 40 meters), and 8.4 meters per second on the East side of the park (at a height of 40 meters), closer to the shoreline of the lake.

In each of these two locations a tower has been located with an anemometer and wind indicator at 40, 30 and 15 meters of height. The logger used was an NRG System model 9200 and it was programmed to measure wind velocity as well as direction every two seconds from three different heights, and record the average every 10 minutes.

The information collected from these eight years of data was utilized in the preparation of Eolo's wind study done by V-Bar and Garrad Hassan.

The proposed project consists of the installation and commissioning of twenty two sets of 2 MW Gamesa G90 wind turbines. The total capacity of the Eolo Wind Farm will be 44 MW, corresponding to annual generation of 162.32 GWh. Gamesa´s WTG are designed to operate at external ambient temperatures -20°C and +30°C. In the platform of the wind turbines, various sensors will be fitted to continuously control different parameters. All this information will be recorded and analysed in real time and fed into the monitoring and control functions of the control system.

The control system will select the correct values for the rotor rotation, the blade pitch angle and the power settings. These will be modified at all times depending on the wind speed reaching the turbine, thus guaranteeing safe and reliable operating in all wind conditions

Gamesa is one of the world leaders in the market for design, manufacture, installation and maintenance of wind turbines, with about 22,000 MW installed in 30 countries on four continents and nearly 14,000 MW in maintenance[3].

Germanischer Lloyd, a renowned international independent engineering firm, has certified the system design, the prototype testing, the manufacturer's quality system and the implementation of the design requirements in production and erection. Germanischer Lloyd attested compliance concerning the design in respect to the following:

- Load Assumptions according to IEC 61400-1, Class IIA
- Safety System and Manuals 50/60 Hz.
- Rotor Blade Gamesa Eolica 44.0 m, Class IIA
- Machinery Components, Class IIA 50/60 Hz.

[3] http://www.gamesa.es/

- Tubular Steel Tower, Hub Height at 78 meters (Class IIA)
- Electrical installations and lightning protection 50/60 Hz
- Commissioning
- Nacelle Cover and Spinner
- Design life time 20 years

The power curve used for the calculation of the annual production of energy corresponds with the power curve furnished in the Garrad Hassan wind study for the Eolo project. Garrad Hassan has reviewed power curves of the potential WTG for the site and forecasted the P75 Net Capacity Factor to be 42.11% for Gamesa; this translates into a net generation estimate of 162,322 MWh/year.

The Eolo wind park will have a control center. The control center of the plant will be approximately 15 to 20 square meters and will have the following cockpits:

- The control room where the computer control center of the wind farm will be housed
- The room of cabins of half a tension (34.5 kV) is where there will be located the electrical cabins of medium tension one for each of the lines coming from each of the generators of the wind farm as well as the cabins of SS.AA rectifier – batteries, capacitor banks, etc.
- The warehouse is where the necessary spares and other material will be located for the operation and maintenance of the wind farm.
- Restrooms and changing rooms for the use of the personnel of operation and maintenance and visitors.
- A meeting room is for use of personnel of the wind farm and for the reception of the scholastic or institutional visits to the wind farm.

Net energy delivered to the grid will be measured at the 34.5/230 kV substation located next to the project site, which includes bi-directional meters capable of measuring energy exports and imports in both sides (i.e. the 34.5 kV and the 230 kV side). Details on the monitoring equipment are presented on Section B.7 below.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Nicaragua (Host Party)	EOLONICA, S.A. – Sucursal Nicaragua (Private Entity)	No
Nicaragua (Host Party)	Eolo de Nicaragua S.A (Private Entity)	No

"Eolo de Nicaragua S.A" is the Original Developer of the EOLO Wind Power Project. The company was established in the Republic of Nicaragua. Upon the achievement of certain milestones Eolo de Nicaragua will transfer its shares to Eolonica S.A.
Eolonica S.A. operates in Nicaragua through its Nicaragua branch, EOLONICA S.A. – Sucursal Nicaragua.

A.5. Public funding of project activity

There are no public funds involved in this project.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

Approved baseline and monitoring methodology applied:

- ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.3.0 – 2 March 2012)

The following tools were applied together with the methodology:

- “Tool for the demonstration and assessment of additionality” (Version 06.0)
- “Guidelines on the assessment of investment analysis” (Version 5)
- “Tool to calculate the emission factor for an electricity system” (Version 2.2.1)

B.2. Applicability of methodology

The consolidated baseline methodology for grid-connected electricity generation from renewable sources is applicable as the project consists of the installation of a new wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant). No fossil fuels or biomass will be used for this project.

B.3. Project boundary

As stated in ACM0002, renewable energy projects shall only account for the amount of CO2 emissions from electricity generation derived from fossil fuelled power plants that are displaced due to the project activity.

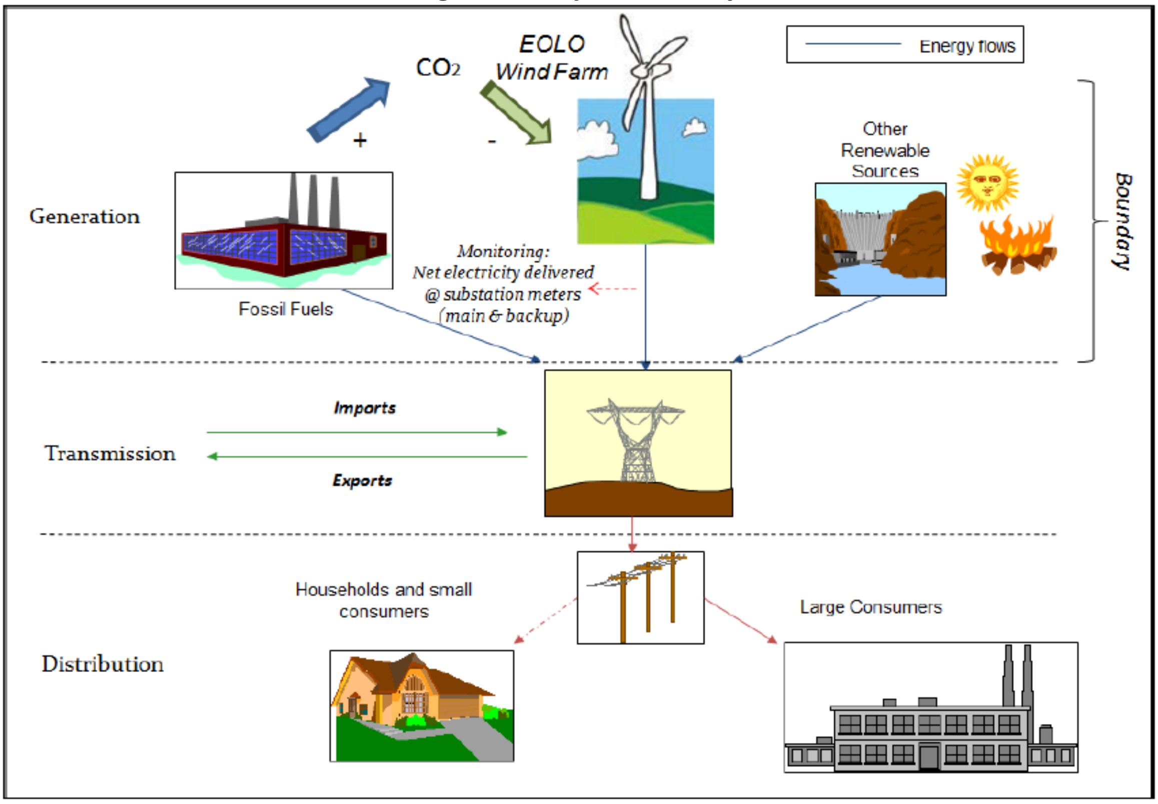
The following table reflects the greenhouse gases and emissions sources considered for baseline and project emissions as per the methodology:

Table 1-Emission Sources (as per ACM0002)

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	Wind Power Generation	CO_2	No	No CO_2 emissions for wind power plants
		CH_4	No	No CO_2 emissions for wind power plants
		N_2O	No	No CO_2 emissions for wind power plants

For the proposed project, the spatial extent of the project boundary includes the power plant and all power plants connected physically to the electricity system the proposed project will be connected to. The latter will be the Nicaraguan Interconnected System (NIS). A diagram of the latter is shown in Figure 2 below:

Figure 2 - Project Boundary



B.4. Establishment and description of baseline scenario

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario foreseen in the methodology is the following:

"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the *Tool to calculate the emission factor for an electricity system*".

This section provides an overall description of the baseline scenario. In line with the previous definition, the baseline consists of either i) other plants currently in the grid, and ii) new additions to the system. The information provided herein, as well as the one used in section B.5, is based upon official statistics published by the INE (Nicaraguan Energy Institute – *Instituto Nicaragüense de Energía*) on its website. All the calculations, graphs and data sources can be found on the baseline spread sheet attached to this PDD[4].

i) The plants in the grid: a description of the NIS

The Nicaraguan Interconnected System (NIS) is a clearly defined grid that runs throughout most of the country, generating around 99% of Nicaragua's electric power, the remaining 1% originated in isolated

[4] A copy of all relevant INE reports with the original figures will be provided to the DOE.

systems[5]. According to the latest data available at the time of furnishing this PDD (2010), the grid's overall capacity is 1,060 MW.

During the 80s, the main actor in the Nicaraguan electric sector was the Nicaraguan Institute of Energy (INE), a state-owned, vertically integrated institution that comprised every activity from planning and policy making to generation, transmission and distribution. In line with the circumstances in most of the countries in Central America, the energy sector of the Republic of Nicaragua undertook significant changes in its regulatory framework in the nineties aiming to increase the energy supply by attracting private investment and enhancing economic efficiency.

The Nicaraguan Wholesale Market (NWM) was born in 1998 after the enactment of Law 272 (Electric Industry Act) and Law 271 (reforms to INE's Organic Law). These norms determined the creation of a contract-based wholesale market, complemented by a spot market that allows balancing any remaining supply and demand within the system.

Since the introduction of these reforms, generation has been provided by both public and private facilities. After an international public bid held in 2000, distribution was granted to DISSUR and DISNORTE, both subsidiaries of Union Fenosa. Only transmission services remained under public management by the state-owned firm ENTRESA. The NWM's dispatch is managed by the *Centro Nacional de Despacho de Carga*[6] (CNDC), the latter being part of ENTRESA. An Operation Council (OC) conformed by representatives of the different actors in the chain and overviewed by the INE, now the regulatory agency involved in the energy market, was created to settle any differences among the parties that eventually arose from the operation of the latter.

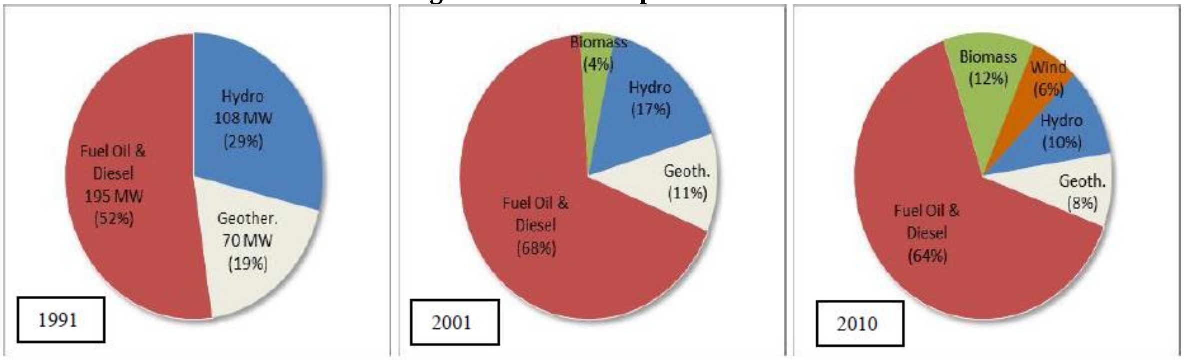
The long-term market is based on previously agreed contracts between generators and distributors/ brokers/users. As a general practice, monomic prices that account for capacity and generation charges (usually, indexed by changes in fuel prices) are settled in these contracts.

Non-contracted energy is traded in a spot market based on a system of price and volume bids and offers for energy. Spot market prices are set for one-hour intervals. All the agents in the system provide daily price and volume offers for the sale of surplus power; the latter of which is dispatched by merit order. The market-clearing price, the price of the last and most expensive unit called upon to generate in each hour, sets the price received by all generators dispatched during that one-hour interval.

The evolution of the grid's composition can be depicted in Figure 3, which shows that by 2001 fossil fuels had increased their share from 52% (in 1991) to 68%, to the detriment of renewable sources (namely, hydro power and geothermal). The capacity mix, however, appears more diversified by 2010: although fossil fuels are still the dominant technology, renewables such as wind and biomass have increased their proportions.

[5] According to INE 2010 statistics, the NIS generated 3,320,918 MWh, while total national generation was 3,364,019 (both figures refer to net generation in 2010).
[6] Spanish for National Load-Dispatch Center

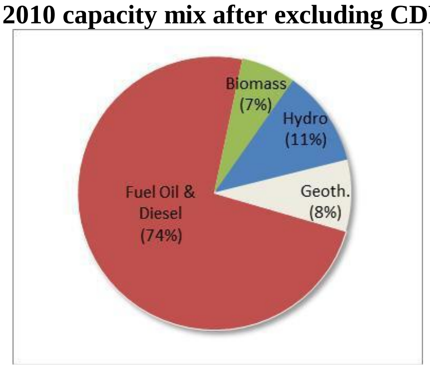
Figure 3: Grid Composition Evolution



Source: Author's elaboration based on INE statistics (see baseline spread sheet attached)

However, this conclusion oversees the impact of the CDM on the Nicaraguan grid. After we exclude registered CDM projects from the set of projects under analysis, the capacity mix is as depicted in Figure 4: 74% of the current capacity is provided with carbon-intensive technologies to the detriment of renewable energies, to a larger extent as compared with the past two decades.

Figure 4- 2010 capacity mix after excluding CDM projects

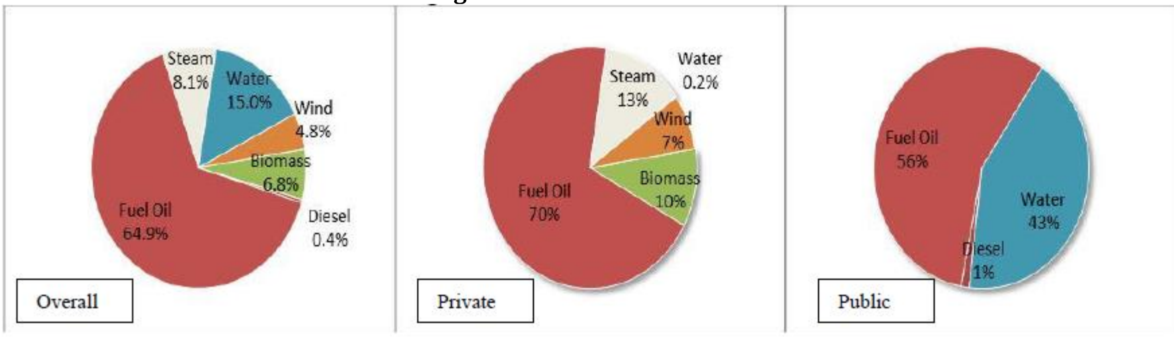


Source: Author's elaboration based on INE statistics (see baseline spread sheet attached)

This fossil fuel dominance logically translates to the generation mix, as depicted in Figure 5. In 2010, the grid generated around 3,321 GWh (net generation), of which 65% was produced using fossil fuels (bunker & diesel). Private power plants, driven by market incentives, provided 65% of the overall generation. However, 70% of this share was obtained from fossil fuels[7]. Public generators, although relying significantly more on large-scale hydro power commissioned in the sixties[8], also provided the majority of their generation from the combustion of fossil fuels.

[7] This share would actually be higher if we exclude generation obtained from registered CDM projects.
[8] Namely, Centroamérica (50 MW in 2010) and Santa Bárbara (54.4 MW in 2010) hydro power stations.

Figure 5 - Generation mix in 2010



Source: Author's elaboration based on INE statistics (see baseline spread sheet attached)

ii) Most likeliest additions to the grid

In order to have an idea of the technology that is likely to be considered for *future* additions, *recent* additions to the grid are analysed. Capacity added in the 2006-2010 period (i.e. last five years) consists mostly of fossil fuelled power plants, whereas renewable energies have been totally comprised of CDM projects.

Table 2 - Capacity additions (last 5 years with available data, 2006-2010, in 2010 capacity in MW

Ownership	CDM	Fossil Fuel	Low Cost/Must-Run	Total
Private	63.0	243.6	0.9	307.5
Public				0.0
Total	63.0 (20%)	243.6 (79%)	0.9 (<1%)	307.5

Source: Author's elaboration based on INE statistics (see baseline spread sheet attached)[9]

Conclusions

The analysis presented on items i) and ii) above allows us to derive the following conclusions about the Nicaraguan grid:

1) Private generators provide most of the available capacity, relying mostly on fossil fuels to operate.
2) As a corollary, fossil fuel power plants are the dominant technology in the Nicaraguan grid.
3) The few renewable energy capacity additions observed depend on subsidized schemes like the CDM.

The tables and figures above show that fossil-fuelled thermal is both the prevalent technology in the country *and* the most common choice when it comes to new additions, and such is the baseline situation in which the Eolo project is expected to take place. A quantitative estimate of these two aspects of the current scenario is presented in the Section B.6.3, where the baseline *ex-ante* emission factor is calculated.

B.5. Demonstration of additionality

To demonstrate that the proposed project activity is not a part of the above mentioned baseline scenario (i.e. to demonstrate that the project is additional), the "*Tool for the demonstration and assessment of additionality*" (version 06), together with the "*Guidelines on the assessment of investment analysis*" (Version 5) are followed.

[9] It is important to note that some of the capacity additions now presented as "private" on 2010 INE statistics were originally reported as "public" in previous years publications. This is because some of these plants were originally leased to the government of Nicaragua.

Project Milestones and CDM consideration

The owner group is aware of CDM incentives, as carbon credits have been critical for the development of Amayo Phase 1 and Phase 2 projects. Said wind farms were developed by representatives from Arctas Capital Group, which is also the project sponsor for the Eolo project.

CDM incentives were considered crucial for the Eolo project, as evidenced by the project´s prior consideration form (received by UNFCCC on 12/04/2011; the same form was received by the DNA on 05/04/2011). On April 6, 2011 the project entered into a contract with CDM consultant firm "Geo Ingenieria Ingenieros Consultores S.A.", to be its advisor during the CDM project cycle, including validation and registration of the project.

A turnkey Engineering Procurement and Construction agreement ("EPC Agreement") has been signed with Gamesa on 31/12/2011. As per the glossary of CDM terms, this date will be the project start date. Financial Closure was targeted for January 31, 2012. The project participants were targeting the issuance of a notice to proceed with construction under the EPC Agreement by January 2012. The Eolo project is forecast to begin commercial operations in January 2013.

Additionality assessment

The additionality tool consists of a series of steps, as stated below:

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

- Sub-step 1a: Define alternatives to the project activity
Being a private initiative, the alternatives for the project developers are mainly to:

1. Pursue the proposed project *without* CDM incentives;

2. Cease to pursue the proposed project, i.e. continuation of the current baseline. This would imply that electricity would be generated by the operation of the rest of the grid-connected power plants and new oil fired additions. This business-as-usual scenario is dominated mainly by thermal power plants that burn fossil fuels in order to operate (as described on Section B.4), therefore producing CO_2 emissions to the atmosphere.

- Sub-step 1b: Consistency with mandatory laws and regulations
Regulatory framework relevant for the proposed project involves the following set of norms[10]

- *Ley No. 272 (1998): Ley de la Industria Eléctrica y Decreto No. 42 (1998): Reglamento a la Ley de la Industria Eléctrica* ("Law of the Electricity Industry and its Regulatory decree").

- *Ley No. 532 (2005): Ley para la Promoción de Generación Eléctrica con Fuentes Renovables* ("Law for the Promotion of Power Generation from Renewable Sources").

[10] Other regulations that are not specific for the alternatives listed were excluded for simplicity; these include Law No. 217 ("General Law for the Environment and Natural Resources") Decree No. 45 ("Regulation for Environmental Impact Assessments and Permits"), among others. All the alternatives listed are in compliance with these norms.

The first alternative depicted on *Sub-step 1a* consists of the proposed project activity undertaken without the CDM. From the Republic of Nicaragua's regulations point of view, this is the same as the proposed project in its present CDM state, which has already proven compliance with all national regulations (see "*Project Milestones and CDM consideration*" subsection above). Specifically, Eolo complies with Law 272, which governs generation, distribution, pricing and transmission of energy in Nicaragua; and it benefits from the incentives established in Law 532, which determines fiscal incentives for renewable energy generation, among which the wind is included.

The second alternative in *Sub-step 1a* consists of no project activity, i.e. the continuation of the business-as-usual scenario. It is assumed that all the existing facilities -as well as those to enter the grid in the future- are in compliance with all the regulations established in Law 272.

- Step 2: Investment analysis

The purpose of this section is to determine whether the proposed project activity is *not*:

(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

As the relevant alternatives in the context of this project involve either to develop the project without CDM incentives or not pursuing the project at all, we will demonstrate that that the project is not economically or financially feasible without CDM incentives.

- Sub-step 2a: Determine appropriate analysis method

In order to demonstrate that the project is not economically attractive, a benchmark analysis will be undertaken. As stated on the "*Guidelines on the Assessment of Investment Analysis*":

"*If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate*" (page 5).

In this case, the project participant is not forced to make an investment in the same or similar products or services. This would be the case, for example, of a public facility which aims at generating a given output independently of the source and technology used (hydro, thermal, etc.). The guidance further states that:

"*The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest*" (page 5).

As this is clearly the case for a private facility in general, and for this project in particular, this justifies the choice of Option III: Benchmark analysis.

- Sub-step 2b: Option III. Apply benchmark analysis

The Internal Rate of Return (IRR) is one of the most widely accepted financial indicators for project evaluation. In this case, equity IRR will be estimated (after tax, considering financial

leverage). As per point 12 on the Guidelines, required/expected returns on equity are appropriate benchmarks for equity IRRs; therefore this benchmark will be used. Furthermore, the tool's Appendix provides default benchmark values for the expected return on equity; thus, the 15.5% reference value for scope 1 in Nicaragua ("Group 1" in the tool) will be used.

Notice that paragraph 7 on the Appendix to the guidelines clarifies that where an investment is carried out in nominal terms, project participants can convert the real term default values provided in the table into nominal values by adding the inflation rate. As our analysis is based on nominal values, the 15.5% real benchmark will be converted into its nominal equivalent.

Energy contracts in Central America are mostly denominated in US dollars, which is why the prices negotiated are subject to adjustment on the basis of US dollars inflation instead of the one affecting local currency. As a conservative approach, our approach considers the lowest value forecasted by the U.S. Bureau of Labor Statistics (2.2%) for the period 2011-2020, as compiled by the Seattle City Budget Office[11]. Hence, the nominal benchmark is obtained as:

$(1 + 0.155) \times (1 + 0.022) - 1 = 0.18041$

That is, the nominal benchmark based on the default values is **18.04%.** As it will be discussed in the sensitivity analysis sub-section below, this benchmark is on the conservative side for the proposed project.

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

The project's cash flow analysis developed by the project's specialists is based on confidential information and its details have only been made available to the DOE.

The version of the model considered herein contains the latest information available at September 2011.

In order to comply with Annex 3 of the 22nd Executive Board Report "*Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios* – Version 2". Said document states that the baseline scenario should refer to a hypothetical situation without any national and/or sectorial policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies[12]. In the specific case of Nicaragua, the relevant law is the "Law for the Promotion of Power Generation from Renewable Sources" (Law Number 532); in the context of the proposed project activity, Law 532 reduces municipal taxes during the project's first 10 years (75% exemption the first three years, 50% the next five years and 25% the remaining two)[13]. As per Annex 3 of EB 22, these incentives have been excluded from the calculations.

The cash flow is based upon the following assumptions:

[11] http://www.seattle.gov/financedepartment/cpi/forecast.htm

[12] This is only true for regulations and policies that have been implemented since the adoption of the Kyoto Protocol by the host country. The government of Nicaragua ratified the Kyoto Protocol on November 1999, while the national law established to promote the diffusion of renewable energy (Law Number 532) in this country is dated May 2005.

[13] Law number 532 also establishes a seven year income tax holiday; however, as the project suffers losses during the first years of operation, it is not affected by income taxes and thus it does not benefit from the incentives foreseen in Law 532 for this tax.

- Overall investment cost for the wind farm will be 111.54 million USD. This includes 76.90 MM USD for the EPC contract and 34.64 MM USD for additional project costs (including construction & development costs, financing costs and fees, interests during construction, contingent costs, etc.).
- Eolo will provide an annual generation of 162,322 MWh, obtained using a 42.11% plant factor. The capacity factor was estimated by the independent third party Garrad Hassan[14], one of the world's largest renewable energy consulting firm.
- Project life is set at 20 years, as indicated by the manufacturer.
- Terminal value of project: 0%
- Energy price is set at 104.50 USD/MWh (this is the price settled in the PPA with Union Fenosa). Energy price escalates as indicated in the PPA: 3% during years 1-11; 1% during years 12-13; 0.5% during years 14-15 and remains constant for the last five years.
- The expected capital structure of this project is 70% senior debt, 5% subordinated debt and 25% equity. A 15 year repayment period was considered (this period includes the one year construction period). Interest rate for the senior loan is set at 9.5%, whereas the interest rate for subordinated debt is set at 12.5%.
- Operation and maintenance is expected to be a total of 2.86MM USD per year from the third year onwards. In the first two years, maintenance warranty and service of the WTGs is covered by the wind turbine supplier (as per the EPC contract) and hence these costs are not included during this first two years (during which O&M costs are 1.52 MM USD/year).

  The equity IRR for the project is 15.16%, below the 18.04% benchmark, which demonstrates that the Eolo Wind Power Project cannot be considered a financially attractive option without the additional revenue provided by the Clean Development Mechanism, i.e. that the project is additional to the baseline scenario.

- Sub-step 2d: Sensitivity analysis

According to the investment guidelines, only variables that constitute more than 20% of either total project costs or total project revenues should be included in the sensitivity analysis. At 162,322 MWh/year and 104.5 USD/MWh (base electricity price), total annual revenues for the project are 16.96 MM USD/year. Being a smaller figure compared to the total investment (111.54 MM USD), yearly revenues will be used in order to determine which parameters are included in the sensitivity analysis.

The following parameters have been considered:

Parameter	**Value (MM USD)**	**% of annual revenues**	**Included?**
EPC contract	76.90	453.42%	Yes
Other investment costs	34.64	204.25%	Yes
Yearly revenue	16.96	100 %	Yes
O&M (including warranty, maintenance and services)	2.86	16.86 %	No
Interest (maximum interest paid in one year considered)	7.90	46.58 %	Yes

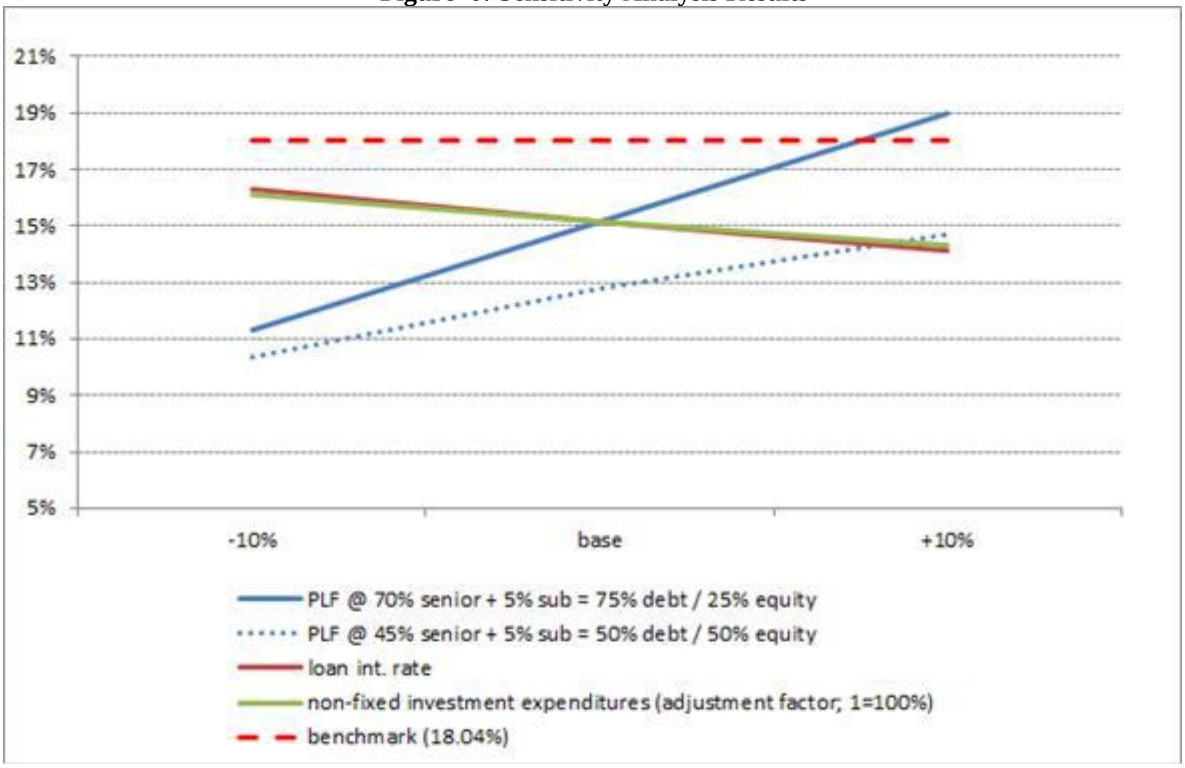
Notice that only the part of the investment that is not fixed through the EPC contract is considered within "other investment costs" as this is the only component of the investment that remains uncertain after the EPC contract is signed. Likewise, the uncertain part of yearly revenues is comprised solely by the plant

[14] http://www.gl-garradhassan.com/en/aboutus.php

capacity factor, as the price has already been fixed according to the PPA. O&M costs are subject to some uncertainty; however, they do not reach the 20% threshold and hence have been excluded from the analysis. Finally, although the amount of interest that the project will pay on each year will not be constant throughout the project lifetime, the largest interest payment according to our model would occur on 2014. This amount (7.90 MM USD) comprises more than 20% of our base year revenue and hence interest payments will be subject to the sensitivity analysis as well[15].

Default +/- 10% variations are considered for each of the parameters. The results are shown in the Figure 6 below:

Figure 6: Sensitivity Analysis Results



The project activity crosses the benchmark only if a permanent 10% increase in generation occurs. However, the following remarks apply:

i) While a 10% increase in generation surpasses the benchmark by 0.91 points[16], the equally likely prospect of a 10% decrease implies that the project will be 6.72 points *below* the benchmark. This basically shows that any investor who is attracted by the potential yield in the optimistic scenario has serious reasons to be deterred after considering the potential losses *below* the 18.04% benchmark, which are more than seven times larger than the possible gains *above* the benchmark. In other words, this possibility is too risky to turn the project into an economically attractive one unless CDM revenues and fiscal incentives are considered.

ii) On the other hand, although the 18.04% benchmark (based on UNFCCC's default values) was chosen for simplicity it is important to emphasize the conservativeness of this assumption. According to paragraph 18 of the guidelines, a 50% debt / 50% equity ratio is assumed as default

[15] Please refer to the financial spread sheet for an assessment on the impact of an extended operational lifetime of the equipment.

[16] 18.95% - 18.04% = 0.91%

whereas the proposed project considers a significantly higher amount of leverage (recall that senior debt comprises 70% of the project's total capital structure and subordinated debt comprises 5% of the project's total capital structure). As both debt holders have priority over equity holders, an increase in the debt-to-equity ratio will necessarily increase the risk born by stockholders, which should be reflected in a *higher* expected return (i.e. a higher equity-benchmark); the relationship between the debt to equity ratio and the cost of equity is well documented on financial literature[17]. Conversely, note that if a 50% debt share is assumed in our financial model, then the IRR resulting in the event of a permanent 10% increase in energy generation would be 14.73%, 331 basis points *below* the 18.04% benchmark. This is shown on the dotted line on Figure 6. Even under the most optimistic scenario, the project fails to reach the benchmark.

These results provide a strong argument in favor of the project's additionality since they consistently support the conclusion that *the project activity is unlikely to be financially attractive unless CDM revenues are taken into account.*

Step 3 (Barrier analysis) is skipped, as allowed by the tool.

Step 4. Common practice analysis

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

In a broad sense, Nicaragua is still going through an early stage in the development of power generation from renewable sources in general and wind projects in particular. Despite its potential for wind power projects, Eolo is only the third wind farm in Nicaragua. The two existing wind power projects are the Amayo projects (Phase I and Phase II), both undergoing different stages of CDM registration[18]. There are no other similar activities currently taking place in the country.

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

This section does not apply to the proposed project activity since, as argued in the previous sub-step, the only similar activities occurring at the moment in Nicaragua are two CDM projects.

The last part of the tool requires a quantitative common practice analysis, undertaken below:

Sub-step 1. Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

For this project, said range includes projects within 22-66 MW of installed capacity.

Sub-step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Sub-step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and projects activities undergoing validation shall not be included in this step.

[17] See for example Chapter 19 on Brealey and Myers, "*Principles of Corporate Finance*", Seventh Edition (McGraw-Hill, 2003),

[18] Phase I was registered on April 12th, 2009 (project reference number: 2315), whereas Phase II was undergoing the final stages of validation at the time this PDD was developed.

The list of projects within the range from the previous step is presented below:

Table 3- Plants Included in the +/- 50% range of the common practice analysis (N_{all}=11)

Unit Name	Nominal Capacity 2010 (MW)	Entry date	Category	Fuel
GECSA-Las brisas-U#2	40	1998	Fossil Fuel	Diesel
GECSA-Las brisas-U#1	25	1992	Fossil Fuel	Diesel
O Momotombo PC-U#2	35	1989	Low Cost/Must-Run	Steam
O Momotombo PC-U#1	35	1983	Low Cost/Must-Run	Steam
GEOSA-Nicaragua-U#2	53	1977	Fossil Fuel	Fuel Oil
GEOSA-Nicaragua-U#1	53	1976	Fossil Fuel	Fuel Oil
GECSA-Managua-U#3	45	1971	Fossil Fuel	Fuel Oil
HIDROGESA-Centro América-U#1	25	1965	Low Cost/Must-Run	Water
HIDROGESA-Centro América-U#2	25	1965	Low Cost/Must-Run	Water
HIDROGESA-Santa Bárbara-U#1	27.2	1965	Low Cost/Must-Run	Water
HIDROGESA-Santa Bárbara-U#2	27.2	1965	Low Cost/Must-Run	Water

Source: Author’s elaboration based on INE statistics (see baseline spread sheet attached)

Sub-step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

There are no power plants similar in technology (i.e. wind power projects) in the group of plants within similar (i.e. +/-50%) range. Thus, N_{diff} = 11.

Sub-step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity. The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:

a) The factor F is greater than 0.2, and
b) N_{all}-N_{diff} is greater than 3.

As for the proposed project F = 0, the Eolo Wind Power Project may not be considered common practice in Nicaragua.

This concludes the additionality argument for the Eolo Wind Farm Project.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

In general terms, emission reductions are given by:

(1)

$$ER_y = BE_y – PE_y - LE_y$$

Where:

ER_y	= Emission reductions in period y (tCO_2e/yr)
BE_y	= Baseline emissions in period y (tCO_2e/yr)
PE_y	= Project emissions in period y (tCO_2e/yr)
LE_y	= Leakage emissions in period y (tCO_2e/yr)

As both project emissions (PE_y) and leakage emissions (LE_y) are zero for wind projects as per ACM0002, baseline emissions (BE_y) will determine the amount of emission reductions (ER_y) attributable to the project activity.

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

(2)

$$BE_y = EG_{PJ,\,y} * EF_{grid,CM,y}$$

Where:

BE_y	= Baseline emissions in period y (tCO_2e/yr)
$EG_{PJ,\,y}$	= Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of CDM project activity in period y (MWh/yr)
LE_y	= Combined margin CO_2 emission factor for grid connected power generation in period *y* calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO_2/MWh)

For the specific case of greenfield projects, the methodology uses the notation $EG_{PJ,y} = EG_{facility,y}$, i.e. quantity of net electricity generation supplied by the project plant to the grid in period y.

The combined margin emission factor consists of a weighted average between two emission factors: the “Operating Margin” (which focuses on existing fossil fuelled plants affected by the project) and the “Build Margin” (which aims to capture the project’s effect on the incorporation of new plants to the grid). The relevant tool applies six steps for the calculation of $EF_{grid,CM,y}$:

Step 1. Identify the relevant electricity systems

For determining the electricity emission factors, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. As described earlier in this document, in Nicaragua the relevant electric power system for the project is the National Interconnected System[19] (NIS), the only grid in the country. Thus, no emissions arising from exports/imports of electricity from other domestic grids need to be accounted for. For international connected systems, information from the INE on electricity imports will be used.

[19] The original name in Spanish is: “*Sistema Interconectado Nacional*”

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

Project participants are allowed to choose between the following two options to calculate operating margin and build margin emission factors:

- Option I: Only grid power plants are included in the calculation.
- Option II: Both grid power plants and off-grid power plants are included in the calculation.

As the NIS represents 99% of the national generation in Nicaragua (see Section B.4), and considering the fact that the project will be delivering its output to the national grid, consequently only grid connected plants will be included in our calculations (i.e. Option I is chosen).

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

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

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.

In Nicaragua, low-cost/must run resources constitute less than 50% of the total grid generation (see Table 4 below); thus, option (a) will be used in the context of this project activity.

Table 4- Annual net generation in the NIS and low cost/must-run participation

Plant Type	Generation (GWh)/Year				
	2006	2007	2008	2009	2010
Hydro	299.25	300.56	529.47	290.16	499.25
Geothermal	276.98	211.06	289.84	262.84	268.25
Fuel Oil & Diesel	2058.12	2115.84	2019.11	2241.04	2168.57
Biomass	194.35	235.29	197.62	206.00	224.56
Wind				109.22	160.30
Total	2,828.70	2,862.75	3,036.04	3,109.26	3,320.93
Share Low Cost/Must-run (Renewables)	27%	26%	33%	28%	35%

Source: Author's elaboration based on INE statistics (see baseline spread sheet attached)

Finally, the data vintage chosen for the estimation of the simple OM is the *ex-ante* option, i.e. the emission factor is determined once at validation stage, which implies that no monitoring and recalculation of the factor during the crediting period will be required; three years of most recent data available will be used in the calculations.

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

The simple OM emission factor is calculated as the generation-weighted average CO2 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.

The simple OM may be calculated according to:
Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

As the information required is available, the preferred option in the tool (option A) will be used in the context of this project activity. Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

(3)
$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{Grid,\ OMsimple,y}$ = Simple operating margin CO_2 emission factor in period y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in period y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in period *y* (tCO_2/MWh)

m = All power units serving the grid in period y except low cost/must-run power units
y = The relevant period as per the data vintage chosen in Step 3 (for this project: 2008, 2009 and 2010)

In turn, $EF_{EL,m,y}$ is determined according to (Option A1 is used as data on fuel consumption for each unit is publicly available in Nicaragua):

(4)
$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

EF_{EL},m,y = CO2 emission factor of power unit m in period y (tCO2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type I consumed by power unit *m* in period *y* (mass or volume united)[20]
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type I in period y (GJ/mass or volume unit

$EF_{CO2,I,y}$ = CO_2 emission factor of fossil fuel type *I* in period *y* (tCO_2/GJ)

EGm,y = Net quantity of electricity generated and delivered to the grid by

[20] In our specific case, an additional parameter (D_i – density of fuel *i*) is used in order to convert fuel consumption data in INE statistics from volume to mass units. This is because the NCV_i parameter obtained from IPCC guidelines is originally expressed in mass units. Please refer to section B.6.2 for detailed information on each of the parameters available at validation.

power unit *m* in period *y* (MWh)

m = All power units serving the grid in period *y* except low cost/must-run power units (imports from another countries are considered units with zero emissions)

i =All fossil fuel types combusted in power unit *m* in period *y* (in Nicaragua: residual fuel oil and diesel)

y = The relevant period as per the data vintage chosen in Step 3 (for this project: 2008, 2009 and 2010)

Step 5. Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following 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.

Option 1 (*ex ante* build margin) is chosen for this project activity.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above[21]:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh); according to the latest information available in Nicaragua, the last 5 power plants to enter the grid were the Che Guevara 4, 5, 6, 7 and 8 power plants[22] (each of these power plants is comprised of several units). Their overall generation was $AEG_{SET\text{-}5\text{-}units}$ = 346,336 MWh.

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, in MWh; in Nicaragua in 2010: AEGtotal = 2,980,912 MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET≥20%, in MWh); in our data, the set goes from Che Guevara VIII (commissioned in

[21] The calculations presented in this sub-section can be reproduced from the baseline spread sheet attached to the PDD (see the BM sheet).

[22] Che Guevara stations 4, 5 and 6 were commissioned in 2009; the remaining power plants began operations in 2010.

2010) to Unit #3 at the Momotombo Geothermal Power Station (commissioned in 2002), with AEGSET≥20% = 624,034 MWh.

(c) From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); thus, according to INE data, $SET_{sample} = SET_{\geq 20\%}$.

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In our case, the eldest unit in the chosen set (Unit #3 at the Momotombo Geothermal Power Station) was commissioned in 2002, which is less than 10 years ago. Thus, according to the tool the sample group for the build margin is SET_{sample} (the remaining steps for the determination of the sample group can be ignored).

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

(5)
$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in period y (tCO_2/MWh)

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

EF_{EL},m,y = CO2 emission factor of power unit m in period y (tCO2/MWh), obtained in an analogous way to equation (4)

m = All power units serving the grid in period *y* except low cost/must-run power units (imports from another countries are considered units with zero emissions)

y = The relevant period as per the data vintage chosen in Step 3 (for this project: 2008, 2009 and 2010)

Step 6. Calculate the combined margin (CM) emission factor

The calculation of the combined margin (CM) emission factor (EFgrid,CM,y) is based on one of the following methods:

(a) Weighted average CM (used for this project); or

(b) Simplified CM (only available for Least Developed Countries or in the presence of data availability issues for Step 5 above).

Finally, the combined margin emissions factor ($EF_{grid,CM,y}$) is calculated as follows:

(6)

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

Where:

$EF_{grid,BM,y}$	= Build margin CO_2 emission factor in period y (tCO_2/MWh)
$EG_{grid,OM,y}$	= Operatin margin CO_2 emission factor in period y (tCO_2/MWh)
w_{OM}	= Weighting of the operating margin emission factor (%)
w_{BM}	= Weighting of the build margin emission factor (%)

The default values for wind projects (w_{OM} = 0.75 and w_{BM} = 0.25) are used in the context of this project.

The sixth step above completes the procedures used in the determination of emissions reductions for this project. Notice that the emission factor will be determined *ex ante* at the time of validation, whereas the project net generation will be subject to monitoring throughout the duration of the crediting period. The *ex ante* estimation of emission reductions, including the *ex ante* value of the combined margin emission factor that will actually be used as a fixed parameter for the estimation of emission reductions during the crediting period, is presented on Section B.6.3 below.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**NCVi,y**
Unit	TJ/Gg
Description	Net calorific value (energy content) per mass unit of fuel *i* in year *y*.
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Fuel Oil: 39.8 TJ/Gg Diesel: 41.4 TJ/Gg
Choice of data or Measurement methods and procedures	No other data is publicly available. IPCC guidelines have been used in a conservative manner.
Purpose of data	Calculation of grid emission factor used for estimation of baseline emissions
Additional comment	-

Data / Parameter	**$EF_{CO2,i,y}$**
Unit	tCO2/TJ
Description	CO2 emission factor of fossil fuel *i* in year *y*.
Source of data	IPCC default values at the lower limit if the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National Greenhouse Gas Inventories.
Value(s) applied	Fuel Oil: 75.5 tCO2/TJ Diesel: 72.6 tCO2/TJ
Choice of data or Measurement methods and procedures	No other data is publicly available. IPCC guidelines have been used in a conservative manner.
Purpose of data	Calculation of grid emission factor used for estimation of baseline emissions
Additional comment	-

Data / Parameter	**Di**
Unit	tons/gal
Description	Density of fuel i in year y.
Source of data	Energy Statistics Manual (OECD/IEA/Eurostat, 2004), page 181, Table A3.8. Available at: http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/NRG-2004/EN/NRG-2004-EN.PDF
Value(s) applied	Fuel Oil: 963.4 kg/m3 (= 0.0036 tons/gal) Diesel: 843.9 kg/m3 (= 0.0032 tons/gal)
Choice of data or Measurement methods and procedures	No regional or national data is publicly available. IPCC Guidelines (2006) do not provide information on density so another source had to be sought.
Purpose of data	Calculation of grid emission factor used for estimation of baseline emissions
Additional comment	-

Data / Parameter	**$FC_{i,m,y}$**
Unit	Thousand gals (as per original INE statistics)
Description	Amount of fossil fuel i consumed by each power plant/unit m in period y.
Source of data	INE - Instituto Nicaragüense de Electricidad (Nicaraguan Electricity Institute)
Value(s) applied	Data for the 2008-2010 period is available in Appendix 4
Choice of data or Measurement methods and procedures	Data is obtained from official, publicly available sources. Links to the specific publications are provided in Appendix 4
Purpose of data	Calculation of grid emission factor used for estimation of baseline emissions
Additional comment	-

Data / Parameter	**$EG_{m,y}$**
Unit	MWh
Description	Net electricity generated and delivered to the grid by power plant/unit m in period y.
Source of data	INE - Instituto Nicaragüense de Electricidad (Nicaraguan Electricity Institute)
Value(s) applied	Data for the 2008-2010 period is available in Appendix 4
Choice of data or Measurement methods and procedures	Data is obtained from official, publicly available sources. Links to the specific publications are provided in Appendix 4
Purpose of data	Calculation of grid emission factor used for estimation of baseline emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

Equations (1) to (6) are used together with information from Appendix 4to estimate the (*ex ante*) combined margin emission factor that will remain fixed throughout the project's crediting period. As mentioned above, the set of plants considered for the operating margin considers imports and excludes only low-cost/must-run facilities.

The set of plants considered for the build margin, obtained according to Step 5 in the Tool, is presented in Table 5 below:

Table 5 - Build Margin Calculations

Unit Name	Entry Date	Fuel	Net generation in 2010 (MWh)	Cummulated Generation (%2010 generation exc. CDM projects)	Emissions in 2010 (tCO_2)	Emission Factor
Che Guevara VIII (Units 1 to 4)	2010	Fuel Oil	67,772	2.3%	44,570	0.66
Che Guevara VII (Units 1 to 6)	2010	Fuel Oil	138,167	6.9%	91,056	0.66
Che Guevara VI (Units 1 to 2)	2009	Fuel Oil	63,611	9.0%	41,823	0.66
Che Guevara V (Units 1 to 3)	2009	Fuel Oil	32,913	10.1%	21,872	0.66
Che Guevara IV (Units 1 to 3)	2009	Fuel Oil	43,874	11.6%	29,132	0.66
Che Guevara III (Units 1 to 3)	2008	Fuel Oil	57,736	13.6%	38,565	0.67
Che Guevara II (units 1 to 3)	2008	Fuel Oil	44,208	15.0%	29,466	0.67
Che Guevara I (Units 1 to 3)	2008	Fuel Oil	44,929	16.5%	30,088	0.67
El Bote (Units 1 and 2)	2007	Water	3,391	16.7%	0	0.00
Hugo Chavez (units 1 to 4)	2007	Diesel	10,348	17.0%	7,046	0.68
GE San Rafael (units 1 to 4)	2004	Fuel Oil	2,240	17.1%	1,811	0.81
NSEL (units 2 and 3)	2004	Bagasse	70,489	19.4%	0	0.00
O. Momotombo PC (unit 3)	2002	Steam	44,357	20.9%	0	0.00
Total			624,034		335,429	0.5375

Source: Author's calculations based on INE statistics (presented on Appendix 4; also refer to baseline spread sheet attached)

Table 6 - Summary OM and BM calculations

Factor		Fuel Consumption (10^3 gals)		Generation (MWh)	Emissions (tCO_2)	Emission Factor (tCO2/MWh)
		Fuel Oil[23]	Diesel[24]			
Operating Margin	2008	133,487	5,649	2,047,315	1,517,055	0.7410
	2009	147,292	3,886	2,242,724	1,651,410	0.7363
	2010	137,854	1,010	2,178,818	1,520,370	0.6978
	$EF_{grid,\mathrm{OM},2008\text{-}2010}$	418,633	10,546	6,468,857	4,688,835	0.7248
Build Margin	$EF_{grid,BM,2010}$	29,966	734	624,034	335,429	0.5375

Source: Based on information from Appendix 4 – Plants included in BM calculation obtained from **¡Error! No se encuentra el origen de la referencia.**

The operating margin emission factors for each year from 2008 to 2010 are calculated using equations **¡Error! No se encuentra el origen de la referencia.** and **¡Error! No se encuentra el origen de la referencia.**. As mentioned earlier, all the plants in the grid except for low-cost/must-run facilities are included[25]. Afterwards, the generation-weighted average of these three factors is obtained ($EF_{grid,OM,2008\text{-}2010}$), resulting in 0.7248 tCO_2 per MWh.

The build margin emission factor ($EF_{grid,BM,2010}$) is calculated by means of equation **¡Error! No se encuentra el origen de la referencia.** and **¡Error! No se encuentra el origen de la referencia.**, for the plants in **¡Error! No se encuentra el origen de la referencia.**, resulting in 0.5375 tCO_2 per MWh. We may now obtain the combined margin emission factor using equation **¡Error! No se encuentra el origen de la referencia.**. This task is performed in the table below, using the default weights for wind projects, resulting in $\boldsymbol{EF_{grid,CM,2010}}$ **= 0.6780** $\mathbf{tCO_2}$ **/ MWh**. This is the *ex ante* emission factor that will be fixed throughout each year of the first crediting period.

Operating Margin	$EF_{grid,OMsimple,2008\text{-}2010}$	0.7248
	w_{OM}	0.75
Build Margin	$EF_{grid,BM,2010}$	0.5375
	w_{BM}	0.25
Combined Margin (EF$_{grid,CM,2010}$)		0.6780

Source: Based on information from Appendix 4

In order to complete the ex-ante estimation of the emission reductions, we will use the expected generation of the project to compute equation **¡Error! No se encuentra el origen de la referencia.**. This value is 162,322 MWh = $EG_{PJ,y}$, which substituted in **¡Error! No se encuentra el origen de la referencia.** together with the combined margin emission factor results in:

ER = 162,322 MWh x 0.6780 tCO_2/MWh = **110,054** $\mathbf{tCO_2}$ (per year)

[23] Generates 10.9585 tCO2/10^3 gals (= $D_i \times NCV_i \times EF_i$),obtained from net calorific values, fuel emission factors and fuel density values used as indicated on section B.6.2

[24] Generates 9.6015 tCO2/10^3 gals (= $D_i \times NCV_i \times EF_i$),obtained from net calorific values, fuel emission factors and fuel density values used as indicated on section B.6.2

[25] Imports considered as one plant with zero emission-factor.

B.6.4. Summary of ex ante estimates of emission reductions

Table 7 - Summary of ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
2013	0	110,054	0	110,054
2014	0	110,054	0	110,054
2015	0	110,054	0	110,054
2016	0	110,054	0	110,054
2017	0	110,054	0	110,054
2018	0	110,054	0	110,054
2019	0	110,054	0	110,054
Total (tCO_2 e)	**0**	**770,380**	**0**	**770,380**
Total number of crediting years	7 years (twice renewable)			
Annual average over the crediting period	0	110,054	0	110,054

Source: Based on information from Appendix 4

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh in period *y*
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in period *y*
Source of data to be used:	On-site metering system
Value of data applied for the purpose of calculating expected emission reductions in section B.5	162,322 MWh/year
Description of measurement methods and procedures to be applied:	Data will be continuously metered; generation data will be aggregated monthly for billing purposes. Electricity consumption from the grid (for start-up or auxiliary purposes) will be deducted from gross exports to the latter in order to obtain *net* electricity supplied to the NIS.

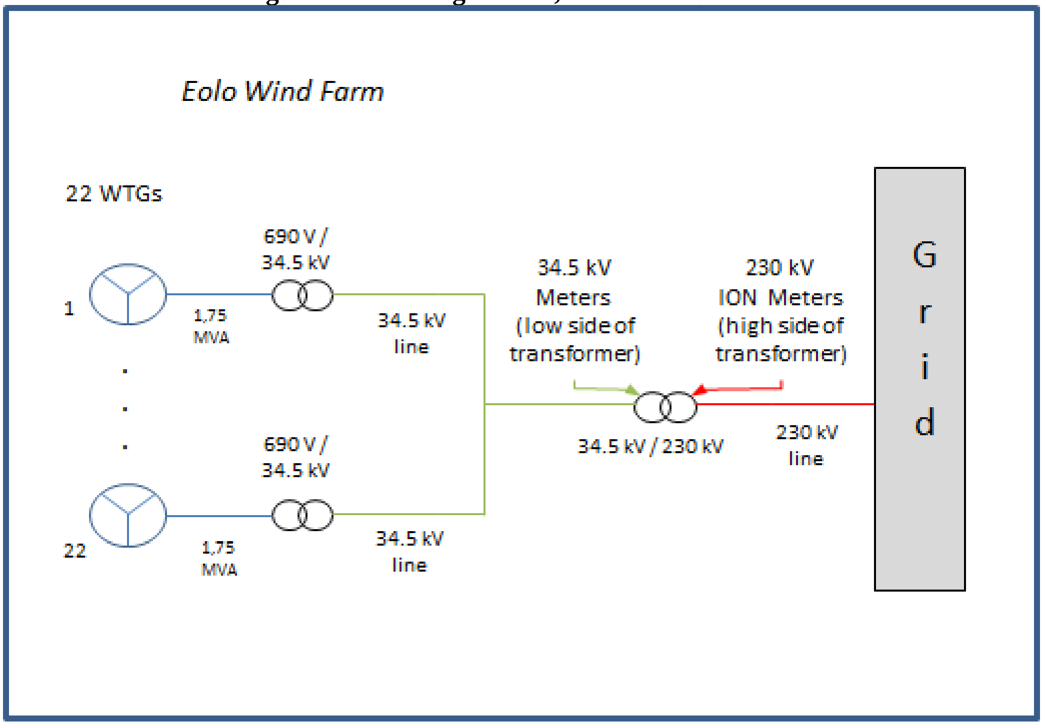
QA/QC procedures to be applied:	Meters have an accuracy rating of at least +/- 0.2% (main) and +/- 0.5% (backup) and are calibrated periodically by entities authorized by the CNDC, as per local standards for electricity transactions in the NIS (according to INE regulations, the meters are audited at least once every two years; see page 9 of the Commercial Annex in the Operation Regulations issued by INE - in Spanish: *Normativa de Operación, Anexo Comercial: Sistema de Mediciones Comerciales, inciso VII.: Revisión de los medidores habilitados* – available to the DOE). Data can be cross checked with the receipts of sales to the grid.
Data / Parameter:	$EG_{facility,y}$
Purpose of data	Calculation of Baseline Emissions
Additional comment	-

B.7.2. Sampling plan

Determination of net electricity delivered to the grid ($EG_{facility,y}$)

The Eolo wind farm will deliver its output to a dedicated substation where the bi-directional meters required for determining the plant's net generation will be installed. Figure 1 shows a metering scheme: electricity is determined at the 230 kV substation meters (both for energy delivered to and consumed from the grid). A main meter and a backup meter will be in place.

Figure 1 - Metering scheme, dedicated substation



The parameter $EG_{facility,y}$ will be determined according to:

(1) $$EG_{facility,y} = EG_{230kV,y} - EC_{230kV,y}$$

where:

$EG_{230kV,y}$ = Gross electricity delivered to the grid (as measured by the 230 kV meter) in period *y*.

$EC_{230kV,y}$ = Electricity consumption from the grid (as measured by the 230 kV meter) in period *y*.

Emergency procedures

Although main and backup meters will be installed in the substation, onsite meters at the 34.5 kV side (of at least +/- 0.5 accuracy level|) are available in case both 230 kV meters at the substation are out. In this case, historical records will be used to account for transmission losses between the 34.5 kV and the 230 kV metering points, if any. The average difference between the readings from the 34.5 kV and the 230 kV meters of the last 3 months will be deducted from the readings obtained from the 34.5 kV meters. Notice, however, that due to the proximity of both set of meters, it is likely that said difference will be negligible.

As the 230 kV meters are the official ones used for billing purposes, any events affecting the latter should be reflected in audit reports prepared by the grid operator (*Centro Nacional de Despacho de Carga*). If a different method for determining net electricity is used in these audit reports, the most conservative values will be chosen.

B.7.3. Other elements of monitoring plan

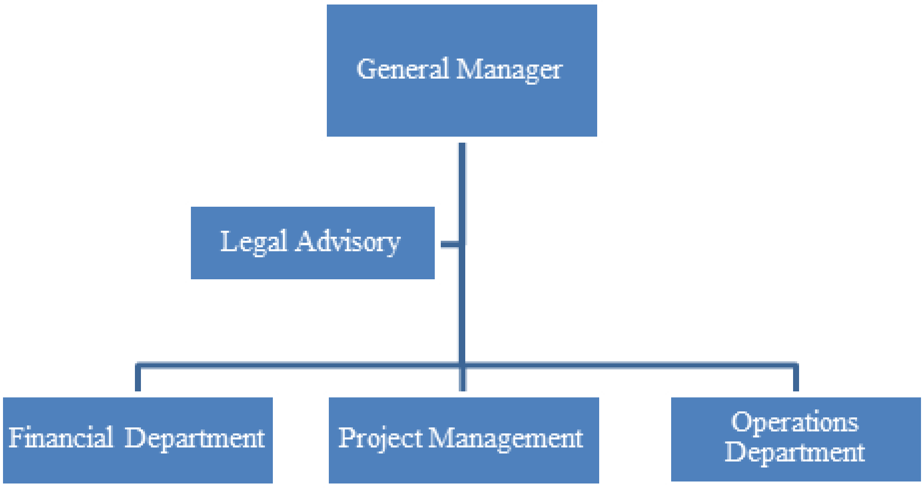
Since the Project Participants have chosen to use *ex-ante* emission factors, there is no need to recalculate each of the latter during the crediting period. Thus, the main variable that requires monitoring is the net amount of electricity that the project delivers to the grid, that is, the amount exported by the project after deducting any electricity imports from the grid that the project uses for auxiliary consumption or plant start-up.

The project developer will implement a management structure where monitoring responsibilities will be explicitly defined. The Operations department will be responsible for ERs monitoring, record keeping and the implementation of proper QA procedures. All the information from this department will be consistent and easily verifiable with all the relevant data from other departments in case an external audit should require it.

All O&M procedures will be adapted to include the carbon monitoring component and the adequate accounting of the emission reductions.

The organizational chart is provided below:

Figure 2 - Organizational Chart



The Operations Department (which reports directly to the General Manager) will have a person in charge of the carbon credits monitoring according to the following responsibilities matrix:

Table 8 - Responsibility matrix

	Plant Manager	**Environmental Coordinator**	**Operations Manager**
Collect data			
Power delivered to grid	R	E	
Ensure calibrations and data quality	R	I	E
Process data			
Input of raw data in spreadsheet		R	E
Cross check data and correct		R	E
Calculate emission reductions		R	E
Quality check calculated emission reductions	R/E	I	R/E
Reporting and archiving			
Report data gaps and errors	I	R	E
Report emission reductions to date	R/E	I	R/E
Archiving of procedures and certificates		R	E
Archiving of data	R	E	E

E = Execute
R = Responsible
I = To be informed

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

31/12/2011 is the project start date. According to Version 05 of the Glossary of CDM Terms, "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity[26]". In the context of the proposed project this date corresponds to the date when the EPC/Wind Turbine supply agreement with Gamesa was signed. Said date took place on 31/12/2011.

C.1.2. Expected operational lifetime of project activity

The equipment has an expected lifetime of 20 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Renewable crediting period.

C.2.2. Start date of crediting period

01/01/2013 or registration date (whichever is later).

C.2.3. Length of crediting period

7 (seven) years, 0 (cero) months.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

In accordance with Article 18 point 19 from Nicaragua's Environmental Evaluation System, the project does not need the preparation of an Environmental Impact Assessment[27]. Instead, an abbreviated procedure called "Environmental Valuation[28]" is required for projects which fall under Category III (moderate impact projects) as is the case for the proposed project activity. The Environmental Valuation of the project consisted of the preparation of an Environmental Management Plan (EMP); the latter is developed according to the potential impacts identified in the Environmental Valuation, and suggests measures to mitigate impacts, protect the environment and maintain the project's environmental feasibility. The environmental permit by MARENA was obtained in December 15th, 2009. An eighteen-month extension was issued on June 7, 2011. Finally, an environmental permit reflecting the actual individual capacity of the wind turbines was issued on February 10th, 2012.

In addition to the plant itself, the project developers had to seek environmental authorization for the substation and the transmission line. According to the same regulation (decree 76-2006, article 17

[26] Glossary of CDM Terms, Version 5, page 28.
[27] MARENA Environmental Evaluation System Decree No. 76-2006, available upon request.
[28] "Environmental Valuation" is a simplified type of EIA for projects with moderate impact.

paragraph 28), these works fall under the Category II (“high impacts”) and hence an Environmental Impact Assessment was required. The latter was completed in July 2011 and approved on October 31st of the same year.

The following is the list of the areas covered in the study with a brief summary of the environmental action plan that will be implemented throughout the different stages of the proposed project to mitigate the latter´s negative impacts:

- **Soil:** To mitigate the erosion and sedimentation process and destabilization of slopes, it will be necessary to replant hillsides and tower sites once the construction is finished. In addition, locating structures that might be unstable or unbalanced shall be avoided. No wastes and/or soil banks shall be left on the sites during the construction and dismantling of the proposed project. The places used for provisory camping shall be left in the same conditions before the setting up.

- **Superficial waters:** Storing combustibles at the site of the proposed project has not been considered. A truck loaded with lubricants and combustibles will be used to provide bulldozers and other machinery materials necessary for preventive maintenance. There should not be leakages that might damage the environment. In case of leakages, physical-chemical conditions of the soil and water must be re-established.

- **Landscape:** in order to minimize their impact towers and complementary equipment must be painted in light colors. In addition, connection cables between the towers must be buried to avoid impact on the landscape and bird fauna. Wind towers shall not be located on the parallel line to the Pan-American road.

- **Flora:** The contractor will only modify areas within the access roads and temporal structures/ sites. Replanting vegetation shall be required in places where the work is completed. Also wood trade for profit is banned. Trees with historic, genetic and landscape value cannot be removed, on the contrary they must be protected.

- **Noise:** to prevent the influence of noisy construction activities they will be limited to a schedule with the less sensitive hours of the day.

- **Bird and Land fauna:** to mitigate possible effects on the fauna, hunting is prohibited for workers of the project. Also illumination systems destined to aerial security must be equipped with lights of low intensity and pulsation to avoid impacts to birds and bats. A minimal safety distance of 200 meters will remain between each wind turbine to allow the passage of birds.

The aforementioned assessment determines that the Eolo Wind Power Project is environmentally and socially viable. The development of the project will not influence traditional economical activities; on the contrary it will represent an important source of employment. The negative impacts are temporary and reversible. Bird fauna will be affected as a consequence of the project; therefore to mitigate this effect a permanent and systematic monitoring will be held.

D.2. Environmental impact assessment

As mentioned before, no EIA assessment was necessary for the wind power plant according to Nicaraguan regulations since the proposed project activity falls under Category III (moderate impact activities). As for the transmission line and the substation, the EIA concludes that the implementation of

the latter is technically and environmentally feasible, and that negative impacts (mainly the effect on the landscape and some risks to fauna) can be mitigated with the application of the environmental management plan.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The stakeholder consultation of the project activity took place on Monday October 10th, 2011, at 9:00 a.m. in the Nicarao Inn Hotel in the city of Rivas, Nicaragua.

The objectives of this presentation were: (a) to inform the local stakeholders of the project activity and its characteristics as a CDM project; (b) to present the socio-economic benefits of the project for the country and the municipality of Rivas; and (c) to gain insights on local concerns and opinions regarding the project activity.

Activities in preparation for the event are described below:

A preliminary research and selection for invitees was carried out by EOLONICA, S.A. The selected stakeholders were: the local government, universities, schools, NGOs, neighbours from the Project's surroundings (which consist on landowners and workers of the farms), and main representatives of the local government from other communities of Rivas's Department. After selection of the organizations and people, EOLONICA delivered personalized invitations on site.

Also EOLONICA delivered personalized invitation cards to several institutions of the national government in the capitol of Managua.

Moreover, MARENA and EOLONICA announced the stakeholder presentation in one of the most popular newspaper in Nicaragua "La Prensa" on October 4th, 2011, one week before the event.[29] In the announcement it was stated that the PDD (Spanish translation) was available for public comments in MARENA´s website and in MARENA's main office and in its offices in Rivas, since October 3rd until October 7th, 2011.

More than 25 participants attended the stakeholder consultation representing a total of approximately 14 organizations and institutions, located around the project site and some others around the country[30].

Phases of the stakeholder presentation:

At the entrance of the conference room the registration process was carried on and was handed out a paper form in which the assistants could write their questions and/or comments related to the project.

The public consultation started with a Power Point presentation that explained the project's features regarding its objectives, location, technology, operations, benefits of the project, mitigation measures and Clean Development Mechanism aspects. Hence during the consultancy, the project participants described the project activity in a clear and complete manner[31], which allowed the local stakeholders to understand the project activity.

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[29] A respective copy of the announcement can be presented upon request.
[30] A list of the participants can be presented upon request.
[31] The consultation and its presentations were in Spanish (Nicaragua official language)

After the presentation a period of time was given to all participants to submit their questions in written form to the project developer and give comments. Each question received satisfactory and comprehensive answers by the project developer. A video of the entire stakeholder presentation is available and can be submitted upon request. A complete summary of the questions and comments can be found in section E.2.

Once the consultation was held, lunch was distributed among all participants

Registration process

Explanation of the project

Participants

Comments and questions from the participants

E.2. Summary of comments received

No comments were submitted in MARENA´s website during the week (October 3rd until October 7th) established by the DNA for public comments.

At the end of the stakeholder presentation, some comments and questions by the participants were compiled and exposed by the expositor. The main topics exposed are summarized below:

One participant asked what will happen with the birds flying near the wind generators. Another stakeholder concern was if this project took in account the existence of other projects already functioning.
One person consulted where the twenty-two wind towers and substation would be located, and which type of contract and conditions would be offered to the landowners.

A stakeholder wanted to know in what percentage the proposed project would contribute to reduce the cost of electricity energy.

One participant asked if the proposed project has policies regarding social welfare, and which are them.

Other participants also wanted to know which activities or programs for the communities nearby the Eolo Wind Farm are going to be contemplated.

Another stakeholder asked if the project was completely approved by Ministry of Energy and Mines (MEM). In addition to this, the person wanted to know what would be the procedures to contract personnel, and the date when operations would begin.

A participant asked about the causes for the environmental impacts. There are several species living in the forest, what will be done to protect them.

Another person asked what kind of help could be facilitated in the reduction of risks and emergency management.

Another participant commented that these types of projects were good considering the use of renewable resources. However his concern was related to local people being employed considering that there aren´t enough people qualified for some jobs.

E.3. Report on consideration of comments received

EOLONICA clarified all the stakeholder's concerns by providing relevant data and answered all question to the satisfaction of the participants. Detailed minutes of meeting delineating the above questions and EOLONICA´s responses have been recorded and written down. These are available upon request.

EOLONICA also informed the stakeholders that the project activity would contribute to the sustainable development of the region and country by facilitating and catalysing local and regional opportunities, thereby creating sustainable economic, social and environmental value.

On the other hand, as no major environmental concerns were raised during the entire stakeholder consultations processes, which were not already addressed by the Environmental Evaluation, it was not necessary to make any changes to the project design or incorporate any additional measures to limit or avoid negative environmental impacts. The same applies to socio-economic concerns.

The proponents will also address the concerns related to social welfare. They will create programs or activities that will have positive impacts on the community.

It is evident from the stakeholder consultation process, that the project is perceived as a positive example for the renewable energy sector in Nicaragua and that it contributes to sustainable development of the region.

Finally, it's important to emphasize that residents and the local government are all very supportive of the proposed project activity.

SECTION F. Approval and authorization

Approval from Nicaragua's DNA was granted on 06/03/2012

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Appendix 1: Contact information of project participants

Organization name	Eolonica S.A. – Sucursal Nicaragua
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E-mail	gtapia@mesoamericaenergy.com
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Title	Manager
Salutation	Mr.
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Middle name	NA
First name	Gabriel
Department	NA
Mobile	NA
Direct fax	(505) 2278-8320
Direct tel.	(505) 2267-8358
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Appendix 2: Affirmation regarding public funding

Appendix 3: Applicability of selected methodology

Appendix 4: Further background information on ex ante calculation of emission reductions

Unit Name	Net Capacity 2010 (MW)	Entry date	Fuel	Generation (MWh)			Fuel Cons. (thousand gals)		
				2008	2009	2010	2008	2009	2010
ALBANISA - Che Guevara VII (Nagarote)-U1	6.8	2010	Fuel Oil	0	0	24,546	0	0	1,477
ALBANISA - Che Guevara VII (Nagarote)-U2	6.8	2010	Fuel Oil	0	0	23,593	0	0	1,419
ALBANISA - Che Guevara VII (Nagarote)-U3	6.8	2010	Fuel Oil	0	0	23,153	0	0	1,392
ALBANISA - Che Guevara VII (Nagarote)-U4	6.8	2010	Fuel Oil	0	0	22,971	0	0	1,381
ALBANISA - Che Guevara VII (Nagarote)-U5	6.8	2010	Fuel Oil	0	0	22,509	0	0	1,354
ALBANISA - Che Guevara VII (Nagarote)-U6	6.8	2010	Fuel Oil	0	0	21,395	0	0	1,287
ALBANISA - Che Guevara VIII (León)-U1	6.8	2010	Fuel Oil	0	0	15,641	0	0	942
ALBANISA - Che Guevara VIII (León)-U2	6.8	2010	Fuel Oil	0	0	16,270	0	0	980
ALBANISA - Che Guevara VIII (León)-U3	6.8	2010	Fuel Oil	0	0	18,234	0	0	1,089
ALBANISA - Che Guevara VIII (León)-U4	6.8	2010	Fuel Oil	0	0	17,627	0	0	1,057
Consorcio eólico AMAYO II	23	2010	Wind	0	0	49,713	0	0	0
ALBANISA - Che Guevara IV (Masaya)-U1	6.8	2009	Fuel Oil	0	29,482	15,562	0	1,854	943
ALBANISA - Che Guevara IV (Masaya)-U1 aux	0	2009	Diesel	0	0	0	0	14	0
ALBANISA - Che Guevara IV (Masaya)-U2	6.8	2009	Fuel Oil	0	29,479	15,409	0	1,849	934
ALBANISA - Che Guevara IV (Masaya)-U2 aux	0	2009	Diesel	0	0	0	0	13	0
ALBANISA - Che Guevara IV (Masaya)-U3	6.8	2009	Fuel Oil	0	30,965	12,903	0	1,899	782
ALBANISA - Che Guevara IV (Masaya)-U3 aux	0	2009	Diesel	0	0	0	0	12	0
ALBANISA - Che Guevara V (Masaya)-U1	6.8	2009	Fuel Oil	0	29,702	10,086	0	1,855	612
ALBANISA - Che Guevara V (Masaya)-U1 aux	0	2009	Diesel	0	0	0	0	10	0
ALBANISA - Che Guevara V (Masaya)-U2	6.8	2009	Fuel Oil	0	29,160	12,860	0	1,798	780
ALBANISA - Che Guevara V (Masaya)-U2 aux	0	2009	Diesel	0	0	0	0	12	0
ALBANISA - Che Guevara V (Masaya)-U3	6.8	2009	Fuel Oil	0	26,159	9,966	0	1,658	604
ALBANISA - Che Guevara V (Masaya)-U3 aux	0	2009	Diesel	0	0	0	0	16	0
ALBANISA - Che Guevara VI (Nagarote)-U1	6.8	2009	Fuel Oil	0	1,523	31,023	0	95	1,827
ALBANISA - Che Guevara VI (Nagarote)-U1 aux	0	2009	Diesel	0	0	0	0	15	0
ALBANISA - Che Guevara VI (Nagarote)-U2	6.8	2009	Fuel Oil	0	1,828	32,588	0	114	1,990
ALBANISA - Che Guevara VI (Nagarote)-U2 aux	0	2009	Diesel	0	0	0	0	0	0
Consorcio eólico AMAYO I	40	2009	Wind	0	109,846	110,583	0	0	0
ALBANISA - Che Guevara I (Tipitapa)-U1	6.8	2008	Fuel Oil	16,130	32,815	15,174	997	2,081	925
ALBANISA - Che Guevara I (Tipitapa)-U1 aux	0	2008	Diesel	0	0	0	38	20	0
ALBANISA - Che Guevara I (Tipitapa)-U2	6.8	2008	Fuel Oil	17,472	33,575	15,257	1,061	2,095	933
ALBANISA - Che Guevara I (Tipitapa)-U2 aux	0	2008	Diesel	0	0	0	41	19	0
ALBANISA - Che Guevara I (Tipitapa)-U3	6.8	2008	Fuel Oil	15,025	32,560	14,498	927	2,052	888
ALBANISA - Che Guevara I (Tipitapa)-U3 aux	0	2008	Diesel	0	0	0	39	21	0
ALBANISA - Che Guevara II (Masaya)-U1	6.8	2008	Fuel Oil	15,385	31,490	18,034	925	1,975	1,096
ALBANISA - Che Guevara II (Masaya)-U1 aux	0	2008	Diesel	0	0	0	28	21	0
ALBANISA - Che Guevara II (Masaya)-U2	6.8	2008	Fuel Oil	14,409	31,740	13,235	865	1,984	806

Unit Name	Net Capacity 2010 (MW)	Entry date	Fuel	Generation (MWh)			Fuel Cons. (thousand gals)		
				2008	2009	2010	2008	2009	2010
ALBANISA - Che Guevara II (Masaya)-U2 aux	0	2008	Diesel	0	0	0	30	17	0
ALBANISA - Che Guevara II (Masaya)-U3	6.8	2008	Fuel Oil	15,485	30,812	12,939	959	1,940	787
ALBANISA - Che Guevara II (Masaya)-U3 aux	0	2008	Diesel	0	0	0	27	20	0
ALBANISA - Che Guevara III (Managua)-U1	6.8	2008	Fuel Oil	5,886	35,099	19,686	297	2,216	1,203
ALBANISA - Che Guevara III (Managua)-U1 aux	0	2008	Diesel	0	0	0	78	18	0
ALBANISA - Che Guevara III (Managua)-U2	6.8	2008	Fuel Oil	5,988	33,355	19,051	307	2,060	1,158
ALBANISA - Che Guevara III (Managua)-U2 aux	0	2008	Diesel	0	0	0	73	17	0
ALBANISA - Che Guevara III (Managua)-U3	6.8	2008	Fuel Oil	6,111	33,728	18,999	319	2,131	1,158
ALBANISA - Che Guevara III (Managua)-U3 aux	0	2008	Diesel	0	0	0	71	18	0
El Bote-Atder-U#1	0.45	2007	Water	1,615	1,420	1,507	0	0	0
El Bote-Atder-U#2	0.45	2007	Water	2,070	1,676	1,884	0	0	0
ALBANISA-Hugo Chavez-U1	15	2007	Diesel	12,614	10,236	2,184	895	705	154
ALBANISA-Hugo Chavez-U2	15	2007	Diesel	13,153	10,040	2,751	952	716	195
ALBANISA-Hugo Chavez-U3	15	2007	Diesel	11,189	8,052	2,699	809	573	192
ALBANISA-Hugo Chavez-U4	15	2007	Diesel	10,601	10,846	2,714	766	772	193
Polaris (PENSA)-U#1	5	2005	Steam	35,878	38,612	35,174	0	0	0
Polaris (PENSA)-U#2	5	2005	Steam	35,579	34,266	33,454	0	0	0
GE San Rafael SA-U#1	1.6	2004	Fuel Oil	987	0	396	60	0	29
GE San Rafael SA-U#1 aux	0	2004	Diesel	0	0	0	11	0	0
GE San Rafael SA-U#2	1.6	2004	Fuel Oil	2,544	2,959	625	159	190	45
GE San Rafael SA-U#2 aux	0	2004	Diesel	0	0	0	24	15	0
GE San Rafael SA-U#3	1.6	2004	Fuel Oil	3,991	3,064	581	247	192	43
GE San Rafael SA-U#3 aux	0	2004	Diesel	0	0	0	39	18	0
GE San Rafael SA-U#4	1.6	2004	Fuel Oil	4,078	2,958	638	252	183	48
GE San Rafael SA-U#4 aux	0	2004	Diesel	0	0	0	42	18	0
Monte Rosa-U#1	16.5	2004	Bagasse	32,002	40,250	38,905	0	0	0
Monte Rosa-U#7	20	2004	Bagasse	37,875	40,178	35,328	0	0	0
Monte Rosa-U#8	15	2004	Bagasse	29,253	37,612	36,848	0	0	0
NSEL-U#2	20	2004	Bagasse	31,296	29,973	31,552	0	0	0
NSEL-U#3	20	2004	Bagasse	36,218	33,182	38,937	0	0	0
O Momotombo PC-U#3	7.5	2002	Steam	43,619	38,489	44,357	0	0	0
CENSA-Mak-No.1	7.2	2000	Fuel Oil	12,139	0	30,845	636	0	1,851
CENSA-Mak-No.2	7.2	2000	Fuel Oil	29,581	27,699	32,806	1,541	1,528	1,972
CENSA-Mak-No.3	7.2	2000	Fuel Oil	31,940	30,534	29,660	1,672	1,711	1,762
CENSA-Mak-No.4	7.2	2000	Fuel Oil	30,569	37,984	27,304	1,608	2,103	1,621
EE Corinto-U#1	18.5	1999	Fuel Oil	133,158	131,933	129,899	7,877	7,806	7,381
EE Corinto-U#1 aux	0	1999	Diesel	0	0	0	76	18	0

Unit Name	Net Capacity 2010 (MW)	Entry date	Fuel	Generation (MWh)			Fuel Cons. (thousand gals)		
				2008	2009	2010	2008	2009	2010
EE Corinto-U#2	18.5	1999	Fuel Oil	133,171	135,301	127,106	7,879	8,007	7,226
EE Corinto-U#2 aux	0	1999	Diesel	0	0	0	76	19	0
EE Corinto-U#3	18.5	1999	Fuel Oil	127,900	124,567	123,384	7,567	7,373	7,010
EE Corinto-U#3 aux	0	1999	Diesel	0	0	0	70	17	0
EE Corinto-U#4	18.5	1999	Fuel Oil	124,611	119,376	128,222	7,360	7,065	7,285
EE Corinto-U#4 aux	0	1999	Diesel	0	0	0	79	17	0
Monte Rosa-U#3	3	1999	Bagasse	0	3	0	0	0	0
Monte Rosa-U#5	4	1999	Bagasse	116	15	0	0	0	0
Monte Rosa-U#6	4	1999	Bagasse	125	17	0	0	0	0
NSEL-U#1	19.3	1999	Bagasse	30,738	24,773	42,989	0	0	0
Tipitapa PC-U#1	10.44	1999	Fuel Oil	79,498	79,667	74,900	4,879	4,888	4,534
Tipitapa PC-U#1 aux	0	1999	Diesel	0	0	0	18	20	0
Tipitapa PC-U#2	10.44	1999	Fuel Oil	78,660	76,663	75,039	4,828	4,704	4,540
Tipitapa PC-U#3	10.44	1999	Fuel Oil	78,491	80,866	76,936	4,817	4,961	4,657
Tipitapa PC-U#4	10.44	1999	Fuel Oil	78,346	75,519	73,549	4,808	4,633	4,449
Tipitapa PC-U#5	10.44	1999	Fuel Oil	77,966	77,898	76,274	4,785	4,779	4,614
GECSA-Las brisas-U#2	40	1998	Diesel	12,541	7,339	3,390	1,192	604	251
GECSA-Managua-U#5	6.2	1998	Fuel Oil	22,746	21,317	22,542	1,501	1,398	1,406
CENSA-Cat-No.1	3.9	1997	Fuel Oil	352	0	0	24	0	0
CENSA-Cat-No.2	3.9	1997	Fuel Oil	12,343	13,810	18,243	795	878	1,110
CENSA-Cat-No.3	3.9	1997	Fuel Oil	9,375	14,793	16,413	605	940	1,000
CENSA-Cat-No.4	3.9	1997	Fuel Oil	5,704	0	18,179	381	0	1,108
CENSA-Cat-No.5	3.9	1997	Fuel Oil	928	0	2,454	61	0	150
CENSA-Cat-No.6	3.9	1997	Fuel Oil	0	0	11,784	0	0	717
CENSA-Cat-No.7	3.9	1997	Fuel Oil	0	0	14,749	0	0	905
CENSA-Cat-No.8	3.9	1997	Fuel Oil	0	6,348	19,254	0	401	1,181
CENSA-Cat-No.9	3.9	1997	Fuel Oil	20,574	19,801	18,994	1,320	1,254	1,165
GECSA-Managua--U#4	6.2	1994	Fuel Oil	19,890	9,168	13,700	1,345	620	876
GECSA-Las brisas-U#1	25	1992	Diesel	1,510	924	219	171	103	25
O Momotombo PC-U#2	35	1989	Steam	174,764	151,473	155,261	0	0	0
O Momotombo PC-U#1	35	1983	Steam	0	0	0	0	0	0
GEOSA-Nicaragua-U#2	53	1977	Fuel Oil	269,247	249,714	193,572	21,305	20,047	14,913
GEOSA-Nicaragua-U#1	53	1976	Fuel Oil	290,354	246,714	177,089	23,062	19,787	13,643
GECSA-Managua-U#3	45	1971	Fuel Oil	166,471	131,475	126,268	15,458	12,190	10,811
GECSA-Managua-U#3 aux	0	1971	Diesel	0	0	0	3	8	0
GEOSA-Chinandega	14	1967	Diesel	0	0	0	0	0	0
HIDROGESA-Centro América-U#1	25	1965	Water	294,816	179,000	269,779	0	0	0

Unit Name	Net Capacity 2010 (MW)	Entry date	Fuel	Generation (MWh)			Fuel Cons. (thousand gals)		
				2008	2009	2010	2008	2009	2010
HIDROGESA-Centro América-U#2	25	1965	Water	0	0	0	0	0	0
HIDROGESA-Santa Bárbara-U#1	27.2	1965	Water	230,967	108,065	226,077	0	0	0
HIDROGESA-Santa Bárbara-U#2	27.2	1965	Water	0	0	0	0	0	0
Imports	0	0	0	28,200	1,687	10,249	0	0	0
Sub Total				3,036,048	3,109,884	3,320,918			
Total Inc. Imports	1,060.1			3,064,248	3,111,571	3,331,167			

Links to information in the INE website are provided in the baseline spread sheet; however, as the route to these files is subject to changes without previous notice on behalf of INE, a copy of the respective documents is provided to the DOE. Entry dates were provided by ENATREL and updated using INE reports from 2006 to 2010.

Appendix 5: Further background information on monitoring plan

Appendix 6: Summary of post registration changes

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		