

Gold Standard Monitoring Report

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Project's name	Amayo 40 MW Wind Power Project - Nicaragua
CDM Reference No. of the project	2315
Gold Standard Reference No. of the project	GS 567
Registration date of the project activity at UNFCCC	April 12 th 2009
Registration date of the project activity at Gold Standard	August 27 th 2010
Monitoring period number and dates included on this monitoring period	6 th MP: 01/05/13 to 30/06/14 (both dates included)
Version number of the monitoring report	Version 3 in effect as of December 18 th 2014
Actual emission reductions achieved during period 01/05/13 to 31/12/13	46,674 emission reductions
Actual emission reductions achieved during period 01/01/14 to 30/06/14	74,548 emission reductions
Total emission reductions achieved during this monitoring period	121,222 emission reductions

The following document is an addendum to the CDM monitoring report corresponding to the May 2013 – June 2014 period for the Amayo Wind Power Project. The purpose of this document is to present the results of the implementation of the sustainable indicators monitoring plan, a specific request for the GS.

The results obtained –presented in detail below- allow us to conclude that the project has actively contributed towards the sustainable development of the Republic of Nicaragua.

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SECTION A. Description of the sustainable indicators monitoring plan

In addition to the requirement of emission reduction monitoring, candidate Gold Standard projects need to monitor and verify the development of *sustainable indicators*.

This section describes the results obtained from the monitoring of sustainability indicators As specified in the GS Annex, sustainability indicators are integrated within the environmental monitoring and management plan. See below the complete list of monitored parameters and its corresponding results¹.

A.1 - Soil

Parameter	Actions to promote sustainable use of land
Sampling points	N/A
Frequency	Yearly
Method Q/Q	Beach Clean Ups, Donation of trees and contributions to local Nurseries.
Results	- The project sponsored a beach cleanup for one week on Holly Week on April 2014 held in the beach of La Virgen in the Nicaragua Lake shore. The community is located at seven kilometers far from the project's site and is a much visited touristic destination for the population of Rivas Department. It was coordinated between Municipal City Hall and Consorcio Eolico Amayo S.A., with the support of other local institutions such as local Red Cross, Firefighters Department, Police, Health Ministry and Local Community Committee of La Virgen. Amayo sponsored providing full alimentation for the volunteers and personal of the Red Cross and Firefighters, supply of t-shirts for volunteers, audio all they long, supply of 30 recipients for waste disposal, 1,500 bags for waste recollection and advertisement signs. The activities included: - Cutting of weeds on the coast. - Permanent cleaning up of the coast and surrounding areas. - Removal of solid wastes in areas of the coast close to the residential areas. - Removal of solid wastes accumulated in a dry riverbed. - First aids attention for tourist. Details can be seen in annex 1: Beach Cleanup Report La Virgen. - The contribution of this period for the local trees nursery as per specific request of the City Hall of Rivas was the donation of trees (395 units) for reforestation. See annex 2: Contributions to Rivas nursery.

¹ As per "Table 8: List of parameters to be monitored" on page 27 of the registered GS Annex).

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	Donation of 395 trees to the nursery of Rivas Municipality.
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Parameter	Number of trees planted during Reforestation / afforestation
Sampling points	Project site
Frequency	Once
Method Q/Q	Manual count
Results	For this current monitoring period no more trees were planted in the project site. As a background, two plantations took place in the past, one in August 2010 (400 trees) and in July 2011 (765 trees). With this last plantation, no more trees are planned to be planted by the project. As of today the trees plantation have grown successfully and has receive proper maintenance in order to ensure its growth. For details see table below.

Parameter	Number and description of maintenance activities undertaken by project members to the reforested areas
Sampling points	Project site
Frequency	Yearly
Method Q/Q	An annual report will be prepared with all the activities undertaken.
Results	As the trees were planted in 2010 and 2011 they already have and age on 3 to 4 years old, and for instance the maintenance is very basic from now on. During this monitoring period the activities of maintenance were mainly cleaning of surrounding weed and trees trimming. No more irrigation is necessary as trees can survive by themselves. The projects also will replant any tree that has been damaged or broken by cattle of the farms. Trees are adapted successfully to the conditions of the planting area. See details in annex 3: Trees plantation report – May 2014.

A.2 - Biodiversity

Parameter	Number of birds collision
Sampling points	Rows of aerogenerators
Frequency	Twice a week
Method Q/Q	Count
Results	During this monitoring period, none birds were found dead around the wind turbines generators. Since the beginning of operation, the project developed a mechanism to follow up the monitoring of bird collisions, and additionally bat collisions, which consist of a writing procedure in order to undertake the counting and reporting and a form to be filled twice a week. See annex 4: Birds and bats collision counting form.

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	One person has been designated to undertake the visual counting weekly. This person reports to the Environmental Coordinator. As well, all the personal working at project site has been instructed to report if they find any dead bat or bird.
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A.3 - Water quality and quantity

Parameter	Lake and river water, water and sludge of the wastewater system.
Sampling points	Five meters from the lake's shore and rivers in points close to the project activity. At the entrance and exit of the wastewater system.
Frequency	Yearly
Method Q/Q	Standard Methods 2000
Results	The water analyses were done on March 11 th 2014. These analyses were done by the certified laboratory CIRA-UNAN. See annex 5: <i>Water tests results</i> to see the analysis results for all the parameters. The water results for this monitoring period were submitted to the environmental authority Marena through Annual Environmental Monitoring Report. See results in Annex B of this document: Water quality test results.
Comments	The environmental authority MARENA confirms through a letter to Amayo that the project does not require performing tests to the sludge (see annex 6: Letter from Marena 2009). The sludge remains in an impermeable cavity meanwhile it is removed by a contracted company for final disposal. The working population at the wind farm plant is very small and relatively small quantities of liquid disposals are put into the system yearly. It is also important to emphasize that the final flow does not go to any water body such as the lake or rivers, and for instance there is no negative impact on water sources. As well, this system is widely approved and used in areas where there is no public sewer system.

A.4 - Air quality

Parameter	Carbon Monoxide (CO)
Sampling points	Project Southeast sector
Frequency	Yearly
Method Q/Q	non-dispersive infrared spectrophotometry
Results	There are not results for this parameter.
Comments	There are no results for this parameter since there are no CO emissions related to wind power projects. It is understood that by a mistake this parameter was left as part of the monitoring plan of the Environmental Impact Study of the project that was done several years ago. Due this, the project requested a letter to the environmental authority were they confirm that the project does not require undertaking carbon dioxide monitoring. Refer to annex 6:

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	Letter from Marena 2009 in which they confirm that the project does not requires performing carbon monoxide tests.
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A.5 - Other Pollutants

Parameter	Workers hearing level
Sampling points	Project site
Frequency	Yearly
Method Q/Q	Audiometry
Results	An audiometry test was performed for each one of the workers that are more exposed to noise at the project site. The audiometry tests were undertaken on May 14 th 2014 by laboratory Medlab. The results show that all workers except one have a hearing level into normal levels. The employee with a hearing problem is the Plant Manager who has a hearing problem called hipoacusia. As per interview with him he said that it was caused due a noise exposition for more than ten years while he worked in a thermic generation plant. As explained in Noise Level Parameter the personnel in the wind farm is not expose to noise. Actually the noise level at the office building (sub estacion) is below to the maximum noise level permitted according to national regulation for work places which is 85 dB(A) without protection for 8 hours of work. See annex 7: Results from audiometry in workers.

Parameter	Project Noise level (db)
Sampling points	Project surroundings
Frequency	Yearly
Method Q/Q	Measures to be performed by means of a sonometer
Results	The noise level study was undertaken on April 2014 by an independent consultant. Refer to annex 8: Monitoreo de Ruido Proyecto Eólico Amayo. The results show the measures both for the Project and for the second phase of the Project (Amayo II). The table below only shows the values measured for the Project. In order to compare the results, the study considered as a reference the maximum measured values established for wind farms at <i>Guia para Evaluacion Ambiental de Energias Renovables no Convencionales</i>, from Chile's noise regulation, as Nicaraguan regulation does not have an own noise normative for wind farms. This regulation specifies that the measured values of a fixed source noise emission will not overcome the background noise (Lf) in 10 dB(A) or more. The values for the Lf noise for the project are 53.2 – 66. 5dB(A). The table below shows that the results comply with this regulation.

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No.	Area	Noise dB(A)
1	Substation-offices	61.2-66.0
2	WT 14	61.9-74.8
3	WTG 15	61.7-73.9
4	WT 19	59.9-70.3
5	House of landowner 1	59.8-62.3 (close to lake shore)
6	WT 1	63.9-75.3 (close to lake shore)
7	WT 4	61.5-62.7
8	WT 8	62.5-64.0
9	WT 3	63.1-65.7 (close to lake shore)
10	House of landowner 2	62.3-63.1
11	WT 10	61.9-67.1
12	WT 13	61.9-66.9
	House of landowner 3	55.1-60.0 (close to highway)

A.6 - Access to energy services

Parameter	Amount of fossil fuels consumption avoided by the project (as per equations presented on page 25 of the GS Annex)
Sampling points	N/A
Frequency	Yearly during crediting period
Method Q/Q	To be performed on an audited worksheet
Results	The latest years with available information are 2011-2013. During said years, the national grid used $FC_{fueloil,2011-2013} = 398,429$ thousand gals of fuel oil and $FC_{diesel,2011-2013} = 5,809$ thousand gals of diesel to generate $GEN_{2011-2013} = 10,937,696$ MWh of electricity (including imports), which implies that for each MWh generated, $FE_{fueloil,2011-2013} = 36.43$ gals of fuel oil and $FE_{diesel,2011-2013} = 0.53$ gals of diesel were consumed in average. As the Amayo wind farm generated $PG_{May\ 2013-June\ 2014} = 170,088$ MWh during this monitoring period, the latter contributed to reduce consumption of fuel oil by $S_{fuel\ oil\ May\ 2013-June\ 2014} = 6,196$ thousand gals and of diesel by $S_{diesel, May\ 2013-June\ 2014} = 90$ thousand gals. See attached spreadsheet "GS Monitoring_diesel & fuel oil", tab "fuel savings".

Parameter	Difference between spot price for energy (short-run marginal costs) and the price Amayo receives (as per equation 1.2 on page 26 of the GS Annex)
Sampling points	N/A
Frequency	Yearly during crediting period
Method Q/Q	To be performed on an audited worksheet

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Results	The average spot price for the monitoring period (May 2013-June 2014) was $p_{avg_spot, May13-June14} = 157.11$ USD/MWh. The price received by the Amayo wind farm in the same period has been $p_{PPA, May13-June14} = 92.26$ USD/MWh; thus, $_{May13-June14} = p_{avg_spot, May13-June14} - p_{PPA, May13-June14} = 64.85$ USD/MWh (that is, the price received by the project is much lower than short-run prices). See attached spreadsheet “GS Monitoring_diesel &fuel oil”, <i>tab “prices”</i>.
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A.7 - Balance of payments

Parameter	Value of fossil fuels avoided by the project (as per equation 1.3 on page 26 of the GS Annex).
Sampling points	N/A
Frequency	Yearly during crediting period
Method Q/Q	To be performed on an audited worksheet
Results	$FE_{fueloil, 2011-2013} = 36.43$ gals / MWh $FE_{diesel, 2011-2013} = 0.5311$ gals / MWh $p_{fueloil, 2013} = 2.28$ USD / gals $p_{diesel, 2013} = 2.966$ USD / gals $PG_{May13-June14} = 170.068$ MWh $Vi_{May13-June14} 14,126.49 + 267.97 = 14,394.46$ thousand USD The value of the fossil fuels avoided by the project during this monitoring period is 14,392.76 thousand USD, an important contribution to the country's balance of payments. See attached spreadsheet “GS Monitoring_diesel &fuel oil”, <i>tab “fuel savings”</i>.

A.8 - Technology transfer

Parameter	Number and description of events related to technology transfer activities undertaken by project members
Sampling points	N/A
Frequency	Yearly during crediting period
Method Q/Q	Evidence from each activity and feedback from participants will be collected and archived
Results	During this monitoring period 289 persons visited the wind farm, mainly students from schools and universities. They were received by the project site staff that performed a presentation about the technical and environmental items of the project activity, and then took all the

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visitors to a visit around the project site. See below a summary of the visits.

Institution	Date of visit	Career	Total of Visitors
Universidad Tecnológica Nicaragüense (U.T.N)	16/5/2013	Industrial Engineer and Systems Engineer	22
Centro de Formación Profesional Rivas - INATEC	7/6/2013	Industrial Engineer, Domestic Electricity and Tourism and Hotel Management	31
Universidad Nacional Agraria	13/6/2013	Renewable Natural Resources Engineer	26
Centro de Formación Profesional Rivas - INATEC	26/6/2013	Domestic Electricity	74
GIZ-Nicaragua	2/8/2013	German International Cooperation	8
U de M	29/8/2013	Journalism	13
Universidad Centroamericana (UCA)	31/10/2013	Quality Environmental Engineer	22
Universidad de Ingeniería (UNI)	15/11/2013	Master on Renewable Energy	7
Visit from Hamburg-Germany	18/11/2013	N/A	30
Universidad de El Salvador	20/12/13	Master on Renewable Energy	20
Universidad Nacional Agraria	23/5/2014	Natural Resources Engineer and Forestry Engineer	36
Total of visitors			289

It was requested to all the visitors to fill a list with his data and to give a written feedback. See annex 9 *Lists of students-visits*.

A.9 - Additional activities undertaken by the project

The project has developed several social projects in Rivas since the beginning of operation. The following list refers to the social projects that have been implemented during 2012-2014 (see annex 10: Social Responsibility Summary Amayo 1).

- Installation of public street lighting at Luis Arroyo and Los Cocos neighborhoods, at community of La Virgen. A total of 29 luminaries were installed. For the first time local residents had street lighting. This was a major benefit in terms of security for the residents and quality life (January 2012).
- Reconstruction of a multisport court at barrio Luis Arroyo, La Virgen. The court was abandoned for several years without any condition to be use. It was restored at a

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100% including the construction of a new court bleacher so people can be seat and enjoy watching the games (May 2012).

- Donation of school bags and school materials for Children at El Capulin school, at community of La Virgen (March 2013).
- Construction of 18 ecological bathrooms to families at community of La Virgen, Rivas. This is the first time that these families have a proper bathroom (April 2013).
- Donation to “Plan Popoyuapa” in April 2014, which was a plan to support the pilgrim carts in honor to “Jesus del Rescate” when they crossed Rivas City. The support consisted on street cleaning before and after and the procession and food for the Red Cross and Firefighters staff.

Other donations:

- Donation to bluenergy’s NGO dedicated to the installation of small renewable energy facilities (solar and wind) in poor communities (July 2012).
- Donation to Fundenic’s NGO related to environment and sustainable development. This entity organized the first Green Race in Managua, Nicaragua, with the sponsorship of private sector, including Amayo. The money raised was used for planting and maintenance of 6,000 trees at a Natural Reserve (May 2012)
- Donation to Teleton’s NGO that work with disabled children (June 2012).
- Donation of 214 school chairs for students of FE Y ALEGRIA schools, which are schools with integral education to poor students.
- Donation to bluenergy’s NGO dedicated to the installation of small renewable energy facilities (solar and wind) in poor communities (March 2014).
- Donation to Techo Para Mi País, NGO dedicated to the construction of houses to families in extreme poverty and integral developments of poor communities (August 2014).

A.10 - Additional information on the implementation status of other items

The purpose of this section is supply information on the implementation status of some other items mentioned on the GS Annex.

During the project’s construction en 2008 several environmental mitigation measures were implemented as follow (according to the environmental impact study of the project, as it has been stated in the GS Annex):

- Soil conditions: several drainages were constructed on the roads in order to maintain the natural flow of the rain water. These drainages are permanently on the project

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roads. A concrete retaining impermeable pool was constructed for the diesel tank that was used for the construction of the project back in 2008 in order to protect the soil of any fuel spillage. The diesel tank was removed once the construction ended and no fuel spillage took place. Fertile soil was removed in order to clear the sites mainly for the roads, provisory camping site and platforms for the crane. After the construction was ended this same fertile soil was used for the revegetation of many pasture areas around the site, planting grass for pasture, as it was the original condition of the soil of those areas. Currently these areas are completed covered by grass for pasture and for instance there is no possibility of erosion.

- Air: The roads were irrigated during construction in order to avoid the suspension of particles, keeping the air clear as possible of particles. The contractor for the construction had a permanent water truck irrigating permanently the roads during all the construction stage.
- Birds and Fauna: In order to protect the birds and other fauna of the project all the workers during construction were instructed on the prohibition of hunting and fishing. As of today the project has surveillance all around the project in order to avoid the entrance of non authorized persons. As well the project installed four sonic deterrents in the wind turbines lines in order to prevent the birds collision to the blades. During the site visit the DOE could verified that these devices are installed. As of today non bird collision has been reported as it could be verified on the monitoring forms for birds collisions counting.
- Flora: The wind turbines were installed in places where there was not forest or trees, as well the construction of the provisory camping site, roads and platforms, so no damages were caused to the small forests that are inside the project site. The wind turbines were installed in open areas (pasture lands). As well, the wind turbines installed at the project site meet the international design standards to minimize the impact on the landscape.
- Project's noise: it is important to remark that there is not a close community to the wind farm. Inside the wind farm lands are a few houses (for vacations) that belong to the land owners and a few houses of their workers, which are far enough from the wind turbines. As of today there has not been any complaint regarding the noise.
- Protection of superficial waters and aquatic fauna: There was not any activity close to superficial waters that involved lubricant wastes or any kind of pollutant substance. Anyway, all the oil and lubricant wastes were disposed adequately and non spillage took place during construction.

SECTION B. Summary and conclusions

The results from the monitoring report show that the project's overall impact on the sustainable development of the Republic of Nicaragua has been positive. The implementation of the monitoring plan for the parameters related with water quality of rivers and lake allowed to verify the conditions of the latter whether they are related to the project or not. Moreover, the studies conclude that the project's impact on this variable has been negligible. A positive impact has been made to the soil factor, mainly through the project's contribution for the reforestation of the area and donations to local nurseries. Likewise, the impact on biodiversity has been insignificant as a very few birds collisions were registered during this monitoring period. The project's potential impact on worker's

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hearing level and the noise level on the surroundings has no negative impacts, as the results of the tests undertaken all fall within normal values.

As expected, the project had a positive impact regarding the items “access to energy services” and “balance of payment”, mainly by reducing fossil fuels consumption. In turn, this occurs because the project generates energy from a low-marginal-cost source: the wind. Likewise, a number of activities allowed complying with the project’s goals towards technology transfer. During this monitoring period, 63 students mainly from universities visited the project, demonstrating that the project still is a close and accessible source of knowledge for educational institutions of this country. Finally, many other activities were undertaken as part of the plant’s social responsibility program, which is mainly focused to the support of the closest communities to the project’s site.

The interaction of these factors allows us to conclude that the project makes a positive contribution to national development.

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SECTION C. Annexes

Annex A: Sustainable Development Assessment Matrix²

Amayo Wind Farm – Sustainable Development Assessment Matrix

Component	Score (-2 to 2)	Comments
Local/regional/global environment		
Water quality and quantity (*)	1	Analyzed explicitly in the EIA, receiving a “+2” score (page 4-8 and 4-14), which corresponds to a “+1” in the GS SD Matrix.
Air quality (emissions other than GHGs) (*)	0	In the EIA noise pollution is included within this indicator; however, under the GS this type of pollution is included in the “other pollutants” component. CO emissions will be monitored; however, the project does not involve any major emissions sources (see EIA 4-11 to 4-13 and 6-1).
Other pollutants (*)	-1	Noise will be generated from the operation of the generators (EIA: 4-8, 4-11 to 4-13, under the “air component” subtitle)
Soil condition (quality and quantity) (*)	1	EIA pages 4-8 and 4-13
Biodiversity (*)	-1	EIA pages 4-8, 4-16 and 4-17.
Sub total	0	
Social sustainability and development		
Employment (quality)	0	No changes in employment quality are expected
Livelihood of the poor	0	Although the project will benefit an economically depressed area, its effects will reach all the inhabitants, no matter whether they are rich or poor.
Access to energy services (*)	1	The project will lower the amount of fossil fuels consumed. An ex-ante estimation of this value is provided in the “Sustainable indicators monitoring plan” section (see also footnote 40).
Human and institutional capacity	0	No changes in this component are expected.
Sub total	1	
Economic and technological development		

² As per Table 4: Amayo Wind Farm- Sustainable Development Assessment Matrix. Page 8 of Gold Standard Annex.

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Employment	1	The project has clear benefits related to this component. See page 4-18 on the EIA for a discussion and box 8 (page 4-8) for a quantification of this impact.
Balance of payments (*)	1	The project has clear benefits related to this component. See the “Sustainable indicators monitoring plan” section in this annex for an ex-ante calculation of this impact.
Technological self reliance (*)	1	Project is first of its kind in Nicaragua.
Sub total	3	
TOTAL	4	

(*) Items marked with an asterisk are the ones included in the monitoring plan as per GS requirements.

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Annex B: Water quality test results

Water test results from water lake and rivers

Parameter	Results
Lake water	
• pH	8.42 pH units
• Dissolved oxygen	7.63 mg.l-1
• Biochemical oxygen demand	9.14 mg.l-1
• Temperature	28.3 C
River San Luis Water	
• pH	7.80 pH units
• Dissolved oxygen	2.41 mg.l-1
• Biochemical oxygen demand	6.49 mg.l-1
• Temperature	27.6 C
River Tisla	
• pH	8.04 pH units
• Dissolved oxygen	5.23 mg.l-1
• Biochemical oxygen demand	13.19 mg.l-1
• Temperature	27.6 C
River Amayo	
• pH	8.02 pH units
• Dissolved oxygen	4.42 mg.l-1
• Biochemical oxygen demand	6.09 mg.l-1
• Temperature	27.3 C

Water test results for wastewater

Parameter	Results
Entrance septic tank	
• pH	7.47 pH units
• suspended solids	1,785 mg.l-1
• sedimentable solids	2 mg.l-1
• grease and oils	78.83 mg.l-1
• Biochemical oxygen demand	2,639.65 mg.l-1
• Chemical oxygen demand	5,100 mg.l-1
• Total phosphorus	49.84 mg.l-1
• Active blue methylene substances	12.840 mg.l-1
• Temperature	27.9 mg.l-1
• Fecal coliforms	1.70E+06 NMP/100 ml
• Total coliforms	1.70E+08 NMP/100 ml

Parameter	Results
Output septic tank	
• pH	7.59 pH units
• suspended solids	13.33 mg.l-1
• sedimentable solids	0.5 mg.l-1

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• grease and oils	11.08 mg.l-1
• Biochemical oxygen demand	304.58 mg.l-1
• Chemical oxygen demand	450 mg.l-1
• Total phosphorus	2.06 mg.l-1
• Active blue methylene substances	10,880 mg.l-1
• Temperature	28.2 C
• Fecal coliforms	1.30E+07 NMP/100 ml
• Total coliforms	1.30E+07 NMP/100 ml