DEVELOPMENT OF TECHNICAL ASSISTANCE TO NICARAGUA:

CDM PORTFOLIO ASSESSMENT AND PROJECT IDEA NOTE DEVELOPMENT PAPER

Project: Energy and Climate Change

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Executive Summary

OLADE / University of Calgary are implementing Phase IV of the Energy and Climate Change Initiative, which continues to support capacity building for OLADE's member countries to participate in the CDM.

As part of this Initiative within the Nicaraguan context, this paper presents the outcomes of technical assistance to the CDM Designated National Authority in Nicaragua, which during Phase IV included updating the CDM project portfolio for this country, preparing two Project Idea Notes (PINs) including one programmatic type project, participating in a Programmatic CDM seminar in Managua, and developing a strategy to implement CDM programmatic activities, thereby making a concrete contribution to CDM strengthening in Nicaragua.

Nicaragua has three projects registered in the CDM (sugar mill cogeneration, vinasse treatment, and geothermal energy), for an expected total of 456,570 tons of CO2eq per year. Three new projects (wind and hydro) are being validated, which would add an expected total of 180,000 tons of CO2eq per year, and another 11 projects have been identified and are beginning the prospecting and development phase with a view to the CDM.

The technical assistance provided also contemplated joint participation to implement the UNEP / Risoe CD4CDM Nicaragua project, facilitate a seminar on Programmatic CDM, and develop two CDM Project Idea Notes (PINs) in support of local project developers, including one Program of Activities (POA).

The PINs that were developed included:

1. *The Nueva Carnic* project for waste water treatment in a meat–processing plant, with a yearly emissions reduction goal in the order of 2,950 tons of CO2eq per annum.

2. The Program of Activities (POA) of the firm *Llama Sana S.A.* for disseminating bio–digester technologies for waste water and animal manure treatment in Nicaraguan cattle farms, with a yearly goal of estimated emissions reductions in the order of 36,000 tons CO2eq.

Objective

OLADE / University of Calgary are implementing Phase IV of the Energy and Climate Change Initiative, which continues to support capacity building for OLADE's member countries to participate in the CDM.

As part of this Initiative within the Nicaraguan context, this paper presents the outcomes of technical assistance to the CDM Designated National Authority in Nicaragua, which during Phase IV included updating the CDM project portfolio for this country, preparing two Project Idea Notes (PINs), and participating in a Programmatic CDM seminar in Managua, thereby making a concrete contribution to the country's project developers and to strengthening the CDM in Nicaragua.

Project selection was achieved with the help of the CDM Designated National Authority in Nicaragua, which has provided full support and facilitation to complete the technical work done.

The PINs that were developed include:

1. The *Nueva Carnic* project for waste water treatment in a meat processing plant.

2. The Program of Activities of the firm *Llama Sana S.A.* for disseminating bio–digester technologies in Nicaraguan cattle farms.

We would like to acknowledge the support provided by the CDM national authorities in Nicaragua during the different stages of this technical assistance.

1. Updating the CDM Project Portfolio in Nicaragua

1.1. Current CDM Project Portfolio in Nicaragua

This chapter provides a September 2008 update on the status of CDM project development in Nicaragua, and provides decision–making considerations for determining possible actions to support early formulation of project ideas in thematic areas that are relevant to the work of CDM developers and national authorities in Nicaragua.

The technical visit that made data collection possible occurred within the context of implementing Phase IV of the Energy and Climate Change Initiative being executed by the OLADE / Universidad de Calgary consortium with financial support from CIDA in Canada.

Nicaragua has various projects in different CDM project cycle stages and others in the formulation process to be submitted for consideration by the CDM.

Table 1 presents information available at the CDM Web site regarding projects that are already registered in the CDM.

Table 1. Nicaraguan Projects Registered in the CDM

Registration Date	Project Name	Involved Countries	Methodology	CO2e Reductions Expected per Year	Project Reference in the CDM
08 April 06	San Jacinto Tizate Geothermal project	Nicaragua Switzerland United Kingdom of Great Britain and Northern Ireland	ACM0002 ver. 4	280703	0198
22 Jun 06	Monte Rosa Bagasse Cogeneration Project (MRBCP)	Nicaragua Brazil Japan Switzerland United Kingdom of Great Britain and Northern Ireland	AM0015	56020	0191
09 Mar 07	Vinasse Anaerobic Treatment Project – *Compañía*	Nicaragua Netherlands	AM0013 ver. 3	119847	0675

Registration Date	Project Name	Involved Countries	Methodology	CO2e Reductions Expected per Year	Project Reference in the CDM
	Licorera de Nicaragua, S. A. (CLNSA)				

Table 2 presents information regarding all Nicaraguan projects that have entered the CDM validation, according to official data available on the CDM Web site.

Table 2. Nicaraguan Projects that have begun CDM Validation

Project Name	Methodology	CO2e Reductions Expected per Year	Comment Period
San Jacinto Tizate Geothermal Project	ACM0002 ver. 2	361,901	27 Mar 05 – 27 April 05
Vinasse Anaerobic Treatment Project – *Compañía Licorera de Nicaragua, S. A.* (CLNSA)	AM0013 ver. 2	62,197	30 Sep 05 – 30 Oct 05
Monte Rosa Bagasse Cogeneration Project (MRBCP)	AM0015	54,041	16 Nov 05 – 16 Dec 05
La Fe Wind Farm Project	ACM0002 ver. 7	43,985	15 Feb 08 – 15 Mar 08
Amayo 40 MW Wind Power Project – Nicaragua	ACM0002 ver. 7	129,999	18 Jun 08 – 17 Jul 08
La Dalia Hydroelectric Project	AMS–I.D. ver. 13	6,092	22 Aug 08 – 20 Sep 08

Table 3 presents the Certificates of Emissions Reduction obtained by Nicaraguan CDM projects.

Table 3. CERs issued for Nicaraguan CDM Projects

Project Name	CER Issuance Date	CERs issued (t CO2e)	Issuance Period	Involved Countries
0191: Monte Rosa Bagasse Cogeneration Project (MRBCP)	21 Jul 2008	79,401	01 May 2006 – 31 May 2007	Brazil Japan Switzerland United Kingdom of Great Britain and Northern Ireland
0198: San Jacinto Tizate Geothermal Project	26 Jun 2008	30,010	01 Jul 2007 – 24 Feb 2008	Switzerland United Kingdom of Great Britain and Northern Ireland

Project Name	CER Issuance Date	CERs issued (t CO2e)	Issuance Period	Involved Countries
0198: San Jacinto Tizate Geothermal Project	29 Oct 2007	22,820	01 Jan 2007 – 30 Jun 2007	Switzerland United Kingdom of Great Britain and Northern Ireland
0198: San Jacinto Tizate Geothermal Project	05 Mar 2007	23,099	01 Jul 2006 – 31 Dec 2006	Switzerland United Kingdom of Great Britain and Northern Ireland
0191: Monte Rosa Bagasse Cogeneration Project (MRBCP)	26 Feb 2007	189,785	01 Mar 2002 – 30 Apr 2006	Brazil Japan Switzerland United Kingdom of Great Britain and Northern Ireland
0198: San Jacinto Tizate Geothermal Project	26 Oct 2006	26,941	01 Jun 2005 – 30 Jun 2006	Switzerland United Kingdom of Great Britain and Northern Ireland

1.2. Identified Projects at CDM Formulation Stages in Nicaragua

Table 4 presents a list of projects –detected by the Nicaraguan DNA– that are in the formulation process and are interested in preparing the Project Development Document (PDD) to begin the CDM project cycle.

Table 4. Other Projects in the CDM Development Cycle in Nicaragua

Project Developer	Name of Project	Location	Technology	Capacity (MW)	Years Proposed for CDM	Beginning of Operations	Contacts
EGENICSA	"Central Hidroeléctrica El Salto Y–Y" project, 26 km from Siuna (RAAN)	26 km from Siuna (RAAN)	Building a 12.5 MW hydroelectric plant with high–efficiency turbines	25	21	2010	Gustavo Adolfo Morice *Compañía Cervecera de Nicaragua S.A.* Tel: (505) 255–7700 Fax (505) 255–7818 gmorice@victoria.com.ni
AIR SHINE ENTERPRISE S.A. (ASHISA)	Riscos de Oro Rosita	Rosita, Siuna RAAN	AM0006 methodology (GHG emissions reduction using manual systems, and E–0003 through certifications	45,000.00 ha	21	Jan–08	Fernando Mayorga, Legal Representative, AIR SHINE Tel: (505) 267–0321, Mobile: (505) 6080808 airshineenterprise@gmail.com
LARREYNAGA	Larreynaga Hydroelectric Project	Jinotega	ACM0002 Methodology Energy generation	17	20	November 2011	Mario Torrez Lezama Dir. General de Proyectos, ENEL Address: Pista Juan Pablo

Project Developer	Name of Project	Location	Technology	Capacity (MW)	Years Proposed for CDM	Beginning of Operations	Contacts
			from renewable sources such as hydropower				Segundo e Intersección de la Avenida Bolívar, Managua, Nicaragua Tel: (505) 277–1778, (505) 277–4166 mtorres@enel.gob.ni
EL BOTE	"El Bote" Hydroelectric Plant	El Cuá, Jinotega	Hydroelectric	0.9	10	2005	Jorge Ayala Rivero. Project Coordinator, ATDER–BL Tel: (505) 7722030, (505) 7725423. posicle2002@yahoo.es, atder@ibw.com.ni
SIEPAC	Electric Inter–connection System project for the Central American countries	The power transmission line going through Nicaraguan territory is 310 km	Energy Efficiency Replacing the existing domestic equipment	N/D	N/D	N/D	Jorge Enrique Martínez Albero General Manager, EPR Costa Rica Tel: (506) 232–6310 Fax: (506) 296–4380 Fernando Alvarez B. Coordinator, EPR Nicaragua jemartinez@eprsiepac.com www.eprsiepac.com
Amayo Wind Project	Amayo Wind Project	Department of Rivas, 129 km South of Managua, on Pan–American highway	Wind Power Generation	39.9 MW	28	Early 2008	Sean Porter, General Manager and/or Mariana Barrios, Environmental Supervisor Tel: (505) 278–4044. Mobile: (505) 438–3392. Porter@arctas.com

Note: On May 08, the Ministry (ONDL) extended the Letter of No Objection. The Amayo Wind Project and the Larreynaga Hydroelectric Plant have already presented their PDDs and are performing the Public Consultation to obtain National Approval.

Table 5 presents other opportunities detected for CDM projects in Nicaragua, according to the prospecting done during the technical assistance phase in Nicaragua.

Table 5. Other Projects Identified with CDM Potential in Nicaragua

Project Developer	Project Name	Place	Type	Capacity (MW)	CDM Years	Start–up	Contacts
Desarrollo Vientos Alisios, S.A.	Las Sierras Wind Project	Filos de Cuajachillo zone, department of Managua	Wind	40.5 MW	20	2011	Marco Antonio Amador Torres Mesoamerica Energy. *Desarrollo de Vientos Alisios, S.A.* Tel: (505) 270–3186 Fax (505) 270–3908 Marco.amador@mesoamericaenergy.com
Empresa Nuevo Carnic S.A.	Project to develop biogas generated in waste water treatment	Km. 10 ½, Carretera Norte Managua, Nicaragua	Bio–digester	N.D.	20	2009	Mr. Manuel Centeno Cantillano, General Manager Km. 10 ½, Carretera Norte P.O. Box 1251 Managua, Nicaragua Tel: (505) 2331185 gerencia@nuevocarnic.com.ni Web page: www.nuevocarnic.com.ni
PROTEINAS NATURALE	Processing sheep blood	Tipitapa, Municipality	Methane prevention	Nicaragua industrially	21	Late 2009	Mrs. Sandra Palacios Km 27, Panamericana Norte, Tipitapa,

Project Developer	Project Name	Place	Type	Capacity (MW)	CDM Years	Start–up	Contacts
S S.A (Protena S.A)	to obtain proteins	of Managua, Km 27, Panamericana Norte.		slaughters 585,000 sheep / yr (5,850,000 litres of blood / yr)			Nicaragua (505)–2701591 Protena@ibw.com.ni
Universidad Politécnica de Nicaragua (UPOLI)	Municipal Program for Prevention & Integrated Management of Solid Urban Wastes	The first project is scheduled to be developed in the city of León.	Mechanical–biological garbage treatment	100 t/day of waste		After the Cooperation Agreement is signed by both parties	Mr. Byron Reyes, Project Coordinator *Universidad Politécnica de Nicaragua* (*Centro de Estudios Biotecnológicos*) Tel: (505) 2494529 Mobile: (505) 942–0620 cebiot@upoli.edu.ni cebiot.upoli@yahoo.es byronereyes@gmail.com
Empresa Nuevo Carnic S.A.	Bio–digester Project	Jinotega, Nicaragua	Biodigesters for "honey waters" from coffee and dairy / meat farms	N/D	N/D	N/D	Guillermo Largaespada General Manager Jinotega, Nicaragua Tel: (505) 7824127 / 8204455 llamasanasa@yahoo.com

1.3. Conclusions

CDM project portfolio development in Nicaragua follows a similar pattern to that detected in other countries of the Central American Region, and it has been noted that:

1. Among the projects that are already registered in the CDM, there is still significant concentration on projects that send renewable energy to the national power grid.

2. New projects entering validation are still centred on adding renewable energy to the electricity network, which is privileged by the electric sector's structural situation in Nicaragua and by the high emissions factor that the country's power grid has.

3. Only 2 of the 3 registered projects have achieved green–house gas emission reductions, and both are renewable energy projects using sugar mill cogeneration and geothermal energy.

4. Recently, six Letters of No Objection were delivered to electric sector projects, which are at different stages of development.

5. There have been no CDM projects developed for industrial–type activities or for waste electric current management, partly because investments have focused on expansion in the sector, and possibly due to the lack of facilitators to promote them (as there are in other countries of the region such as Guatemala and Honduras).

6. Potential interest to develop Programmatic CDM has been detected in sectors such as efficient lamps that can be distributed through initiatives like Petrocaribe, and entrepreneurial promoters in the field of farm waste bio–digestion (coffee plantations, dairy and meat farms).

7. Through joint work with Nicaragua's CDM Designated National Authority, a potential PIN appraisal process was developed together with interested

industries. It consisted of a technical visit, assessment / recommendation by OLADE's consultants, and a decision by the Nicaraguan DNA on the industries and projects selected for exploration through PIN accompaniment. Annex 1 of this paper contains the respective reports on companies appraised for PIN decision making.

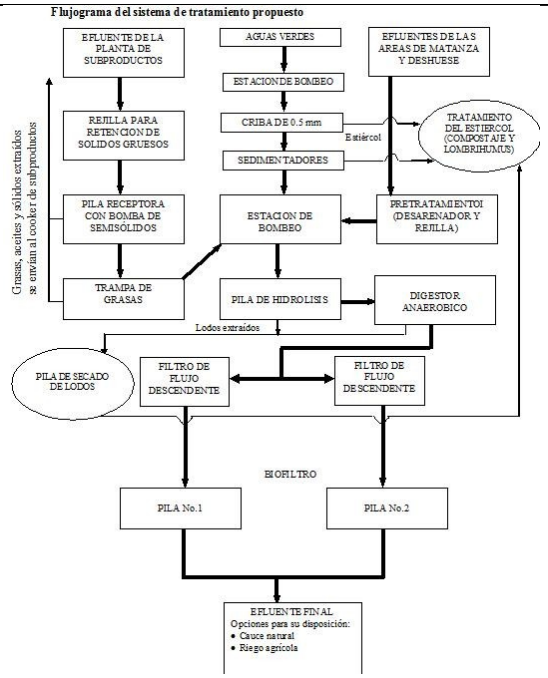
2. Development of the Project Idea Note for Recovery and Use of Biogas from Waste–Water Treatment, *Empresa Nuevo Carnic S.A*.

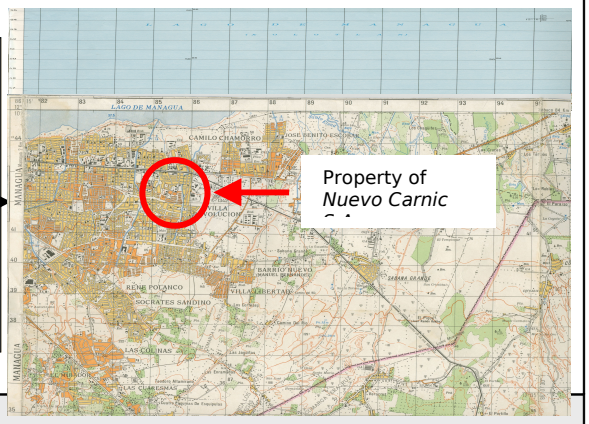
Project Idea Note

Recovery and Use of Biogas from Waste–Water Treatment, *Empresa Nuevo Carnic S.A*.

A. **Basic Project Description**

Project name and presentation date	**Recovery and Use of Biogas from Waste–Water Treatment, *Empresa Nuevo Carnic S.A*.** 20/07/2008
Technical Summary of Project	
Project goal	To improve the treatment of waste water generated in the industrial cattle slaughtering process of the company *Nuevo Carnic S.A.*, with recovery and use of biogas generated in the anaerobic phase of the new proposed system.
Technical description of the project and proposed activities	This project represents the introduction of a treatment system with methane recovery and burning in the boilers for on–site heat use, as part of a series of sequential stages without generating sludge, based on an existing water treatment system with anaerobic pools without methane recovery. The proposed improved treatment system contemplates utilizing and integrating part of the existing water and solids collection, transportation and handling systems. It also contemplates separate pre–treatment stages for some of the flows due to their particular characteristics: effluent from the by–products area, green waters (from washing the corrals, cattle and viscera), and water from the slaughtering and de–boning area (red water). Then the combined waters enter the primary treatment, once pre–treated, which consists of: • Pumping station, • Hydrolysis tank • Anaerobic digester • Effluent tank The methane emissions prevention phase occurs in the anaerobic digester, the design of which facilitates collection and channelling of the biogas for use. Finally, a more passive secondary treatment system is designed and operated, consisting of vertical and horizontal–flow open bio–filters with a considerable surface area. The system proposed for *Nuevo Carnic S.A.* will generate treatment by–products primarily in the anaerobic (reactor) stage, such as biogas that is of interest to the company as it will be used to generate heat energy for cooking the by–products, and this will reduce the consumption of bunker fuel used in boilers to generate steam.
Technology to be used	Treatment system dimensions are based on a projection 650 heads of beef slaughtered per day, generating 1,500 m³ of waste water per day, as the figure obtained under current processing conditions. The bio–digestion area will consist of two USB–type reactors in parallel, given the flow rate to be treated.

	
Project Owner and Developer	
Name	***NUEVO CARNIC S.A.***
Organizational Category	Private Limited Stock Company
Other project function(s) of the project developer	Participant in project financing and construction, operator of the integrated water treatment system, and consumer of the biogas that is generated.
Summary of project developer's relevant experiences	The company *Nuevo Carnic S.A.* was formed and began its operations at its present site in August 1961, thereby encouraging the production sector to reactivate its investment in livestock. The slaughtering plant's current installed capacity is 460 heads of beef per day, and is in the process of expanding its production capacity to 650 heads per day. The company *Nuevo Carnic S.A.* has an industrial slaughter house for bovine cattle and a meat distribution branch for the local and export markets. It has obtained the HACCP certificate for export to destinations like the USA, and the operation has been authorized to process organic meat (Chain of Custody).
Address	Km. 10 ½, Carretera Norte P.O. Box 1251 City: Managua, Country: Nicaragua
Contact person	Mr. Manuel Centeno Cantillano, General Manager
Telephone / fax:	(505) 2331185
E–mail / Web page	E–mail: gerencia@nuevocarnic.com.ni Web page: www.nuevocarnic.com.ni
Project sponsors / financers	
Name and current status	The company usually funds its projects with its own capital, but wants to financing options. The funding project has been presented to entities such as the World Bank, the *Banco Centroamericano de Integración Económica* (*BCIE*), and BANPRO, but they have not made a decision yet. On the domestic front, an investment proposal is being developed in coordination with the financial manager, to be submitted to a public entity called *Financiera Nacional*, which as per the Nicaraguan procedure determines the type of financing (medium or long–

	term and the amount payable). With the final design that is pending, it will be possible for *Nuevo Carnic* to obtain final quotes to include in the financing proposal request to *Financiera Nacional*.
Project Type	
Target Green–House Gas (GHG)	CH_4
CDM Sector Scope	
[**x**] **Energy production**	*[**x**] Energy efficiency by substituting a fossil fuel*
[x] Waste management	*[x] Use of emissions from wastes*
Project Location	
Region	Central America
Country	Nicaragua
Province / Department	Managua
City	Managua
Brief description of project location	The project is located in the so–called North Zone of Managua city, also known as *Carretera Norte*, which is primarily an industrial area. However, in the vicinity of *Nuevo Carnic* there are also new residential areas and the operations associated with the international airport. The property has a total of 20.1 ha and borders to the South with the *Almacén Aduanero* and *Reparto Montecristi* buildings, to the North with the properties of the *Las Delicias* and *Las Delicitas* farms owned by the *Fundación Edwin y Roberts Samuels*, to the East with land belonging to the *Universidad Nacional Agraria*, and to the West with a natural waterway and the *Residencial Casa Real*.  
Expected Time Line	
Earliest project commencement date	2010
Estimated time required before operation start–up after PIN approval	1 year
Project life	20 years
First year that Certified Emissions Reductions (CERs) are expected	2010

Current project status or phase	Feasibility study completed, final design phase in progress, inviting bids for construction, and fund raising.

B. Expected Environmental and Social Benefits

Estimated green–house gas reductions (in metric tons of $C0_2$ equivalent)

Units in metric tons of CO_2 equivalent per year [tons CO_2e / year]

Per annum (yearly average): **2,950** ton CO_2e / year
Cumulative for life of project: **58,920** ton CO_2e
Cumulative over 10 years: **29,500** ton CO_2e
Cumulative until year 2012: **8,840** ton CO_2e

Year	Avoidance of methane (ton CO_2/year)	Released emissions of bunker with biogas (ton/CO_2/year)	Baseline (tonCO_2/year)	Project Emissions (tonCO_2/year)	Reduction of emissions (tonCO_2/year	Reduction per periods
2010	4,048	808	4,856	1,910	2,946	
2011	4,048	808	4,856	1,910	2,946	
2012	4,048	808	4,856	1,910	2,946	8,838 a 2012
2013	4,048	808	4,856	1,910	2,946	
2014	4,048	808	4,856	1,910	2,946	
2015	4,048	808	4,856	1,910	2,946	
2016	4,048	808	4,856	1,910	2,946	20,622 a 7 years
2017	4,048	808	4,856	1,910	2,946	
2018	4,048	808	4,856	1,910	2,946	
2019	4,048	808	4,856	1,910	2,946	
						29,460 a 10 years
Total	40,480	8,080	48,560	19,100	29,460	

The proposed treatment system design offers the following performance:

Input values of the different parameters of the sewage and removal expected

Parameter / Stage	DQO (mg/l)	DB05(mg/l)	Total suspended solids (mg/l	Fats and Oils (mg/l	pH
Entrance	5,436	2,169	2,230	1,922	6.9 – 10.9
Pretreatment	5,000	2,000	2,007	1,730	6.9 - 10.9
% of removal of pretreatment	8	8	10	10	
Anaerobic stage	1,200	480	301	78	6.8 – 7.2
% of removal of anaerobic	75	75	75	95	
Filter	600	240	90	27	6.8 – 7.2
% of removal of filter	50	50	70	65	
Horizontal biofilter	84	34	18	7	6.8 – 7.2
% removal of biofilter	86	86	80	75	
Exit	84	34	18	7	6.8 – 7.2
%total removal	98.4	98.4	99	99.6	

Parameters required by law Decree 33-95, article 29

The baseline data used for carbon estimates are based on the above table, plus the following data:

- 100% of the waste water from *Nuevo Carnic* goes to the existing pool system.
- Pool system removal is 50 %
- Typical NCV and FE data reported by the IPCC and methodology used.

Baseline Scenarios
(before project)

Methodologies used:

AMS I.D. Thermal Energy for the User with or without Electricity.

AMS III.H. Methane Recovery in Wastewater Treatment, Small–scale Project Activity, Version 9

For the above methodology, the included categories refer to measures that recover methane from biogenic organic material in waste water by way of the following options:

(i) *Substituting an aerobic waste water or sludge treatment system for an anaerobic system with methane recovery and burning*

(ii) Adding an anaerobic sludge treatment system with methane recovery and burning to an existing waste water treatment plant that has no sludge treatment

(iii) Adding the methane recovery and burning process to an existing sludge treatment system

(iv) Adding methane recovery and burning to an existing anaerobic waste water treatment system such as an anaerobic reactor, pool, septic tank, or others at the plant site

(v) Adding anaerobic waste water treatment with methane recovery and burning, with or without anaerobic sludge treatment, to an untreated waste water flow

(vi) Adding a sequential waste water treatment stage with methane recovery and burning, with or without anaerobic sludge treatment, to a waste water treatment system without existing methane recovery. For example, adding treatment in an anaerobic reactor with methane recovery as a sequential step in treatment for waste water that is currently being treated in an anaerobic pool without methane

	recovery. For the purposes of the waste water treatment component, the current waste water treatment situation in Nicaragua's beef slaughter houses is to use oxidation pools, which are found in the country's seven slaughter houses. The industrial facilities at Nuevo Carnic have a number of deep pits in series (around 21 pits nearly 3 m deep), through which the pre–treated waste water flows (after separating solids in a settling tank that are then stabilized and worm composted), emulating anaerobic pool treatment. This water is then discharged into the municipal sewage system that flows into the Managua Lake (approx 1.5 km). For the component of substituting bunker consumption, the baseline would be continuing use of this fossil fuel in the operations of *Nuevo Carnic*.
Specific Global and Local Environmental Benefits	
Global Benefits	It will contribute to reducing world–wide CO_2 emissions.
Local Benefits	– Pursuant to National Decree 33–95, we expect to reduce industrial waste–water pollution of the receiving body, Lake Xolotlán of Managua, thereby promoting the conservation of that watershed. – Reduced fuel consumption used in boilers that generate steam.
Environmental Impact Assessment	No negative environmental impacts are expected. Rather, we anticipate enhanced control and treatment of waste water, solid wastes, and odours from *Nuevo Carnic* industrial process, to be mitigated through the anaerobic reactor and other elements of the treatment system, as well as collecting and burning biogas in the boilers. The status of the procedures relating to environmental permits is: • The soil use certificate, to be issued by the Managua's mayor, is in the processing phase. • The environmental permit, requested from the Ministry of Environment and Natural Resources (MARENA), is in the procedural phase, and is linked to the plant's Environmental Impact Assessment (EIA), which is under review through *Nuevo Carnic*'s Environmental Management Plan. The effluent management project is included in the implementation of *Nuevo Carnic*'s Environmental Management Plan (EMP), which was recently submitted to MARENA for approval. The project EIA is awaiting approval of the EMP.
What guidelines will be applied?	Law No. 217: *Ley General del Medio Ambiente y los Recursos Naturales* Law No. 620–2007: *Ley General de Aguas Nacionales* Law No. 297: *Ley General de Agua Potable y Alcantarillado Sanitario* Law No. 274: *Ley Básica para la Regulación y Control de Plaguicidas*, *Sustancias Toxicas, Peligrosas y Otras Similares* Law No. 277: *Ley de Suministro de Hidrocarburos* Law No. 225: *Ley Especial de Delitos contra el Medio Ambiente y los Recursos Naturales* Decree No. 9–96: *Reglamento de la Ley General del Medio Ambiente y los Recursos Naturales* Decree No. 32–97: *Reglamento General para el Control de Emisiones de los Vehículos Automotores de Nicaragua* Decree No. 33–95: *Disposiciones para el Control de la Contaminación Proveniente de las Descargas de Aguas Residuales, Domésticas, Industriales y Agropecuarias* Decree No. 432–89: *Reglamento de Inspección Sanitaria* Decree No. 76–2006: *Sistema de Evaluación Ambiental* Decree No. 394: *Disposiciones Sanitarias* Ministerial Resolution No. 04–2000, Art. 4.1 defines the component of the Gradual Decontamination Plan for dumped fluids in accordance with what is established in Decree No. 33–95 and the Water Use Reduction Plan developed for the industrial sector. NTON 05 001–99: *Norma Técnica Obligatoria Nicaragüense para el Control Ambiental en*

	Mataderos NTON 05 014–02: *Norma Técnica Obligatoria Nicaragüense Ambiental para el Manejo, Tratamiento y Disposición Final de los Desechos Sólidos no Peligrosos* International Standards (HACCP, SSO and BPM)
Socio–Economic Project Benefits	
Benefits to the country or to the Lake Xolotlán basin	From the beginning of project planning, direct and indirect jobs have been created, from professional to technical levels, such as: ✓ Consultants ✓ Engeneers ✓ Contractors ✓ Surveyor ✓ Attorney ✓ Temporary Workers – During the construction stage, an estimated total of 25 persons will be required for 8 months. – In the operation and maintenance stage, we estimate needing to create directly and indirectly a total of 2 permanent jobs and 3 temporary jobs, some of which will be highly skilled. – The project will include necessary measures to eliminate or significantly reduce negative impacts on the recreational and scenic value of the area. – Contribute to the ecological enhancement of Lake Xolotlán.
Local Benefits	✓ Job creation ✓ Training ✓ Infrastructure for the waste water treatment system Local social actors have not been consulted. The existing regulatory framework (EIA) and the project developer's opinion will determine the need for a Social Impact Assessment. No negative social impacts are anticipated, rather: ✓ The possibility of using this project as a case for study and research by the universities and the sector. ✓ Broadcasting values relating to environmental protection and conservation. ✓ Economic development due to the creation of sources of employment.
Environmental strategy / host country priorities	One of the priorities that will prevail in this project is implementing better waste–water management in the company, which will help to comply with the applicable environmental laws and standards. We esteem that the project is consistent with: 1. Achievement of applicable national policies and strategies, such as the Strengthened Strategy for Economic Growth and Poverty Reduction, National Energy Policy (Decree 13–2004), and the National Development Plan. 2. Nicaragua's 2001–2006 Environmental Plan (PANIC from the Spanish), the National Action Plan to Address Climate Change, the National Biodiversity Strategy, the Water Resource Plan, and other binding national strategic instruments relating to economic issues. 3. Adoption of environmentally friendly technologies and generation of knowledge regarding them and their best practices. 4. Utilization of renewable and/or alternative sources of autochthonous energy. 5. Creation of new jobs. 6. Reduction of fossil fuel imports and/or pollution.

C. Finances

Total Estimated Project Costs				
Development costs (budget status and outcome)	Feasibility study (up–dated): US$ 4,850.00 (finalized) System design: US$ 11,730.00 (finalized) Supervision: US$ 11,016.00 (under review) Environmental Management Program: US$ 7,620.00 (finalized) TOTAL DEVELOPMENT COSTS: US$ 35,316.00			
Construction / Installation Cost:	US$ 1,662,700.00 (see detail in Annex 1)			
Other costs	Project start–up: US$ 6,120.00 (under review)			
Total Project Costs	US$ 1,704,136.00			
Potential or identified sources of financing *(CERs)*				
Own capital	US$	*Nuevo Carnic S.A.*	100%	Committed X
Debt – long term	ND	ND	ND	ND
Debt – short term	ND	ND	ND	ND
Not identified	The organization is raising funds from different institutions. Nuevo Carnic normally works with its own capital, but due to the project size perhaps it should approach financial institutions.			
CDM contribution (supplementary income from sale of CERs)				
Average abatement per year	2,950 ton $CO_{2\,e}$			
Indicative CER price	**€ 10 / ton CO_2**	**€ 12 / ton CO_2**	**€ 15 / ton CO_2**	
CER sales until 2012	€ 88,383	€ 106,059	€ 132,574	
CDM contribution if certified for 7 years	€ 206,223	€ 247,467	€ 309,334	
CDM contribution if certified for 10 years	€ 294,603	€ 353,523	€ 441,904	
CERs sold in advance	*Not contemplated*			
Basic profitability estimate				
Internal Rate of Return (IRR)	*If the CDM project is financed, indicate the Financial Rate of Return with or without CER sales.* Without CERs, this project only has yearly revenues of around US$ 100,000, coming from saving about 270 tons of bunker to be substituted for biogas. The barriers that the project faced throughout its development have been: 1. Financial: The anaerobic reactor technology that simplifies gas collection and burning is very costly, and the project will not generate income. Substituting bunker will generate savings, albeit not very significant ones, regarding potential income from monetizing the CDM project. 2. Regulatory: The national water board, ENACAL (*Ente Nacional del Agua*), has refused to treat the water generated by *Nuevo Carnic S.A.* in the centralized system project for residential water from Managua and to decontaminate Lake Xolotlán. This is due to the nature			

	of the water generated. In contrast with other industries, the company must develop its own treatment system, and this requires financial resources. 3. Technological: an anaerobic reactor requires significant learning on behalf of Nuevo Carnic to operate it, in contrast with the needs to manage the current pools. The operation costs and the risks of the technology going out of operation are greater than those of a pool system.		
Internal Rate of Return with CERs	NA		
Internal Rate of Return with CERs, until 2012	NA	NA	NA
Internal Rate of Return with CERs, 7–year period	NA	NA	NA
Internal Rate of Return with CERs, 10–year period	NA	NA	NA

ANNEX 1

ESTIMATED BUDGET TO BUILD THE *NUEVO CARNIC* TREATMENT SYSTEM

DESCRIPTION	TOTAL COST	TOTAL
7.1.– PRELIMINARIES	**US$**	**N° 1**
TOTAL 7.1.– PRELIMINARIES		**500.00**
CONDUCTION TUBING		**N° 2**
SUB–TOTAL OF MATERIALS	**4,230.00**	
SUB–TOTAL OF SERVICES	**2,661.25**	
TOTAL 7.2.– CONDUCTION TUBING		**6,891.25**
GREASE TRAP AND WET WELL		**N° 3**
SUB–TOTAL OF MATERIALS	**31,021.30**	
SUB–TOTAL OF SERVICES	**13,951.77**	
TOTAL 7.3.– GREASE TRAP AND WET WELL		**44,973.07**
7.4.– HYDROLYSIS TANK		**N° 4**
SUB–TOTAL OF MATERIALS	**127,342.64**	
SUB–TOTAL OF SERVICES	**48,573.12**	
TOTAL 7.4.– HYDROLYSIS TANK		**175,915.76**
7.5.– DIGESTER		**N° 5**
SUB–TOTAL OF MATERIALS	**390,220.16**	
SUB–TOTAL OF SERVICES	**127,630.31**	
TOTAL 7.5.– DIGESTER		**517,850.47**
7.6.– EFFLUENT TANK		**N° 6**
SUB–TOTAL OF MATERIALS	**1,018.00**	
SUB–TOTAL OF SERVICES	**12,887.20**	
TOTAL 7.6.– EFFLUENT TANK		**13,905.20**
7.7.– SETTLING TANK		**N° 7**
SUB–TOTAL OF MATERIALS	**77,552.20**	
SUB–TOTAL OF SERVICES	**27,193.27**	
TOTAL 7.7.– SETTLING TANK		**104,745.47**
7.8.– HORIZONTAL BIO–FILTER TANKS		**N° 8**
TOTAL 7.8.– HORIZONTAL BIO–FILTER TANKS		**531,897.54**
7.9.– DOWN–FLOW FILTER		**N° 9**
SUB–TOTAL OF MATERIALS	**207,858.35**	
SUB–TOTAL OF SERVICES	**6,235.75**	
TOTAL 7.9.– DOWN–FLOW FILTER		**214,094.10**
7.10.– COLLECTION BOX FROM THE BIO–FILTER TANKS		**N° 10**
SUB–TOTAL OF MATERIALS	**2,439.00**	
SUB–TOTAL OF SERVICES	**1,571.50**	
TOTAL 7.10.– COLLECTION BOX FROM THE BIO–FILTER TANKS		**4,010.50**
7.11.– DRYING TANK		**N° 11**
SUB–TOTAL OF MATERIALS	**20,213.40**	
SUB–TOTAL OF SERVICES	**11,724.02**	
TOTAL 7.11.– DRYING TANK		**31,937.42**
7.13.– DISTRIBUTION BOXES		**N° 12**

DESCRIPTION	TOTAL COST	TOTAL
SUB–TOTAL OF MATERIALS	**4,556.00**	
SUB–TOTAL OF SERVICES	**3,436.80**	
TOTAL 7.13.– DISTRIBUTION BOXES		**7,992.80**
7.13.– DISTRIBUTION BOXES		**N° 13**
SUB–TOTAL OF MATERIALS	**4,556.00**	
SUB–TOTAL OF SERVICES	**3,436.80**	
TOTAL 7.13.– DISTRIBUTION BOXES		**7,992.80**
TOTAL US $	**1,662,706.38**	

Thursday 25 de June de 2009

Empresa *Nuevo Carnic S.A.*
Managua, Nicaragua

Attn: Mr. Manuel Centeno Cantillano, General Manager

RE: **Completion of professional support services for PIN approval: Project for Recovery and Use of Biogas from Waste–Water Treatment, *Empresa Nuevo Carnic S.A*., with the support of OLADE and the DNA of Nicaragua**

Dear Mr. Centeno,

May I take this opportunity to great you very sincerely and to present the PIN of the reference and its respective calculation sample, enclosed with this note.

To supplement this, we would like to offer below a few general comments on the PIN and related project:

- It is our perception that the plant cost is very high. This is aggravated by the fact that it is not very clear how the organization will finance the project. Water consumption in the process is excessive, and reducing it could also lower the investment considerably, as its design is primarily hydraulic. This matter could be a priority for the company.

- Perhaps forced aerobic refining followed by the digester would be more reasonable, in terms of investment (although not of operating costs).

- The organization should seek a way to encourage the market to recognize the costs associated with this enhanced treatment plant.

- There are CDM project risks associated with determining the base line and methodological restrictions at the time of this review that should be monitored and considered for future defence of a CDM project at the PDD level, especially when making a go / no go decision. For example, the way the water is managed today [50% to drainage (red water) and 50% to a reservoir / pit without management and with percolation (green water)], there is really no CDM project due to issues with the base line defined according to the existing small–scale methodology.

- Furthermore, there is no kind of data on the pool system removal efficiency (as the base–line scenario, what would best suit the company, and the actual situation) to justify the project. So we estimate that with 5,000 mg/l there could be a removal of 50% of the organic load in total waste water for estimation purposes.

- The industry has not been complying with national legislation for nearly 8 years, which is a risk element.

- The system's anaerobic phase, which occurs in the digester, could mean preventing 4,850 ton $CO_{2\ eq}$ in emissions per year with the design parameters provided by *Nuevo Carnic* in actual operations. This is above the estimates of 2,960 ton $CO_{2\ eq}$ per year, which is the outcome of the ex–ante calculation using the methodology and is the information presented in the PIN. This also eventually means a potential savings of 400 ton of bunker per years, as compared to 300 ton.

- All of these calculations are based on 1,500 m^3 per day, which has not been reached yet.

- If everything works out well in the validation processes, monetization for emissions reductions may be about US$ 450,000 in 10 years, in the most conservative case, based on the above criteria, with transaction costs of some US$ 150,000 in that period, plus the costs for equipment and monitoring operations, keeping in mind the risk of operating the system itself. This is information that we are offering in order to facilitate decision making by *Nuevo Carnic*. Although this is a separate matter, bunker savings could be added, which would represent some US$ 120,000 per year (a good return for the project).

- In general, we see the need for more work in defining this project's elements and criteria, and hope to have been of some help in that direction, aside from the CDM project opportunities.

We suggest considering the following strategic elements:

1. Assess ways to decrease waste–water flows, and review the system design with the resulting reductions.

2. Review the technological proposals and investments defined for the system so far.

3. If, with this data, the organization decides to go ahead with the CDM project, it should immediately direct 100% of all waste water into a suitable pool system and begin monitoring the output appropriately. This will be a clear signal to the authorities of your actual interest in solving the waste water problem, and a concrete contribution and justified evidence for the CDM project base line.

Sincerely,

Oscar Coto and Luis Roberto Chacón

3. Development of the CDM Program of Activities Idea Note for the company *Llama Sana S.A*.

PROJECT IDEA NOTE FOR A CDM PROGRAMME OF ACTIVITIES (POA)

POA NAME **: Waste Management / Sequestration and Destruction of Methane Generated by the Northern Nicaragua Dairy Sector**

DATE **: *07/10/2008***

A. POA DESCRIPTION, TYPE, LOCATION, SCHEDULING

PROGRAMME OF ACTIVITIES (POA) OBJECTIVE *Describe in no more than 5 lines* *Remember that a POA is to implement a policy, measure or goal through institutional, financial or methodological scaffolding.*	Disseminate use of anaerobic bio–digestion technologies in small–scale dairy farms. Improve dairy farm waste treatment systems that keep methane from being released into the air, by installing horizontal–flow bio–digesters, while increasing overall dairy sector competitiveness by reducing air pollution and including innocuous elements in business management. With the above, the POA helps reduce climate change issues by destroying generated methane.
POA DESCRIPTION AND SCOPE OF ACTION *Describe in no more than ½ page*	The lack of technical know–how, limited economic capacity, and deficient environmental awareness among Nicaraguan dairy producers in a rural setting that is home to nearly 80% of Nicaragua's population, have led to dairy–farm wastes being released into the environment, polluting soils and water sources, and missing the chance to turn them into energy and fertilizers to return to the earth they came from, thereby contributing to environmental conservation and strengthening this economic activity. A programme of CDM activities to provide technical and financial support to Northern Nicaragua's organized dairy sector is essential to improve solid and liquid waste management in dairies, recover and burn the methane gas that is generated (reduce GHG emissions), and use it along with treated wastes having value as fertizers. The POA will promote resource integration to overcome the barriers that restrict better management of the environment and its innocuous elements for dairy farms in that part of Nicaragua. The programme will attend to the change process, financial needs, technological transfer and acquisition, and associated services, needed in Nicaragua to achieve the objectives. As an outcome, the level of competitiveness in the dairy sector can be raised while promoting corporate social responsibility. On the other hand, the programme will make it possible to reduce green–house gas emissions derived from farm–level activities.
TECHNOLOGY TO BE EMPLOYED *Describe in no more than 5 lines*	The technological package to be used will consist of: • Technical training and coaching for dairy farmers to develop and implement

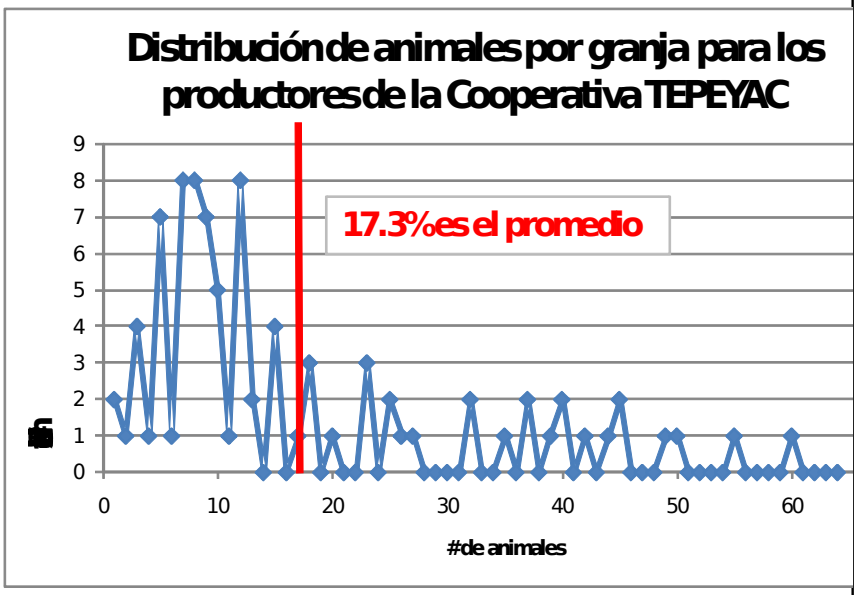
	pollution prevention actions: less water use and polluted water production, separate solids management, and an awareness and understanding of important environmental issues and impacts. Anaerobic treatment of waste water from washing of farm facilities (stables, milking equipment, corrals, and others) using bio–digesters with methane capture suited to the investment possibilities of the sector and programme, which should include settling, equalizing and control of liquid wastes. This technological proposal is a horizontal flow system made of heavy–duty tubular polypropylene plastic with ultra–violet protection, for a useful life of up to 11 years, achieving flexibility, resistance and versatility of application. • Assistance and coaching to size, build, start up and operate (monitor) the waste management systems. • Applying and using waste in the field. • Farm extension on Best Farming Practices (BFP) and Best Manufacturing Practices (BMP) to ensure enhanced milk quality. 
qu	The typical programmatic activity is a dairy or creamery (milking site), where cows stay for some 4 hours per day, including the milking and waiting areas, treatment systems, and biogas use points (stoves). The CPAs to participate in the POA currently dump waste into pits and from there into nearby water sources following the topography of the land (slopes). In some cases of larger–scale dairy farms, this water is channelled to gravity–driven irrigation systems that use sluice gates to flood grazing areas, which supplies some level of fertilization for soils and pastures. They are usually characterized as: • Small–scale production units • Poor waste management –causing pollution– and under–use as fertilizers. • Weak management of milk innocuousness. • Technological backwardness with regard to development in other latitudes.
TYPE OF POA	
Green–house gases targeted **CO_2 / CH_4 / N_2O** *(mention what is applicable)*	CH_4

Type of activity **Abatement / sequestration**	Reduction
Field or sector of application	13. Waste management and elimination 15. Agriculture
LOCATION OF THE POA	
Country	Nicaragua
City	Departments of Boaco, Jinotega, Matagalpa, and Estelí, cattle areas in the North of the country
Brief description of location ***No more than 5 lines***	The rural areas of the above departments, which have large pastures in flat areas with forestry propensities, the where milk cows graze. This grazing process is accelerating the physical degradation and infertility of this resource, causing irreversible damages to natural plant regeneration and producing ecological alterations, primarily in the waterways of these zones.
COORDINATING ENTITY	
Name of Coordinating Entity	***Llama Sana S.A.***
Roles of Coordinating Entity	Coordinating entity that manages the programme as an integrated portfolio. • Make the policy, measure or goal viable, and ensure the technical and operational specifications of system parameters. • Attract more CPAs and include them in the POA. • Negotiate with the parties involved. • Purchase resources and manage the finances and funding. • Quality control for processes and technologies. • Monitoring / ensuring results and avoiding double accounting. • Providing the incentives and structure for others to achieve GHG reductions. • Continual monitoring and follow–up of installed structures (first feed, first use of biogas, and follow–up over the next months). • Ensure that each CPA meets the requirements to join the programme.
Type of Organization	Private company
Contact person	Mrs. Guillermo Largaespada
Address	Bo. San Antonio, 200 m North of bridge, Jinotega, Department of Jinotega, Nicaragua
Telephone / fax:	(505) 7824127 / (505) 8204455
E–mail / Web address	llamasanasa@yahoo.com
Main activities ***Describe in no more than 5 lines***	Professional advisory services, integral solutions and transfer of technologies such as farm–level bio–digesters, waste management and technical studies for productive environmental management. This includes elements such as: • Installation • Biodiversity inventories • Obtaining permits • Environmental Management Plans and integrated waste management
Information on entity: may be legal, financial, etc.) ***Describe in no more than 5 lines and enclose any reference documents***	***MISSION*** To support sustainable production and environmental management / enhancement through productive waste management. ***VISION*** To be leaders in the industry of environmentally–friendly (organic) waste management solutions for small, medium and large farm producers.

Summarize the relevant experience of the entity with the subject of the POA ***Describe in no more than 5 lines***	*Llama Sana* has specialists in the field of farm waste management (engineers in agronomy) and technicians with ample experience. It also has specialists in ecology and eco–systems. Finally, it has institutional relations with the industry and in the last few years has been publicizing the goal set for this POA. It has warehouses, communications media, marketing, computer equipment, means of transportation, land, and others.
NAMES OF OTHER PARTICIPANTS IN THE POA *In the case of other intermediaries, development and publicity agents, etc.*	**1. The *Fundación para el Desarrollo Tecnológico Agropecuario y Forestal de Nicaragua* (FUNICA)** is a not–for–profit civil society organization made up of 27 public and private institutions, universities and NGOs, producer associations, and professional guilds / unions relating to the science and technology of the Nicaraguan agricultural sector. Mission: To strengthen the competiveness of Nicaragua's agricultural and forestry sectors through political advocacy and capacity building for technological innovation. Vision: To be a reference point for technological innovation in the agro–forestry sector with broad participation in the public and private spheres. www.funica.org.ni, (505) 276–1316, Ext 109 / 118 **2. *COOPERATIVA DE SERVICIOS MULTIPLES "TEPEYAC" R.L.*** of the Municipality of *San Rafael del Norte*, Northern Zone, Department of Estelí.
SCHEDULING	
Earliest POA start date	2010
First year the POA is expected to produce emissions reductions	2010
POA life period	13 years, consistent with the useful life for technology
Current POA status or phase ***Identification, opportunity study, prefeasibility assessment, development of plan, feasibility assessment, negotiation, financing, etc.*** ***Describe POA progress status in no more than 5 lines***	The need to find ways to solve the complex problems of inadequate environmental management in the dairy business and to finance the path towards that goal has lead to exploring the Clean Development Mechanism as an alternative through this PIN.
Progress status regarding approval by the country's CDM Designated National Authority ***Describe whether contacts have been made, a Letter of No Objection has been received, or the Letter of National Approval***	The programmatic initiative in general and development of this PIN have been supported by Nicaragua's Designated National Authority with the help of the Energy and Climate Change Initiative developed by OLADE / University of Calgary. A letter of no objection has not been received, and no application has been made to that effect.

has been granted.	

B. *BASE LINE SCENARIOS, ESTIMATES, ELIGIBILITY*

ESTIMATE OF GREEN–HOUSE GASES ABATED *In metric tons of CO_{2e}* *Remember that the central analysis unit should be the CPA, so give your answer as the accrued number of CPAs per year that you estimate will enter the POA, and present the estimating procedure used in a table on the enclosed form.*	Initially we looked at dairy farmers in the Tepeyac Cooperative, currently a total of 95, which served as a basis to obtain the average in these facilities of 14 cows per dairy farm. This information is used to estimate the POA's potential emissions reductions.  The estimation process was developed in keeping with what was established by the IPCC and the small–scale AMS methodology. III.D

ESTIMACIONES POR CPA

EQUATION 10.23
CH_4 EMISSION FACTOR FROM MANURE MANAGEMENT

$$EF_{(T)} = \left(VS_{(T)} \bullet 365\right) \bullet \left[B_{o(T)} \bullet 0.67\, kg/m^3 \bullet \sum_{S,k} \frac{MCF_{S,k}}{100} \bullet MS_{(T,S,k)}\right]$$

Where:

$EF_{(T)}$ = annual CH_4 emission factor for livestock category T, kg CH_4 animal^{-1} yr^{-1}

$VS_{(T)}$ = daily volatile solid excreted for livestock category T, kg dry matter animal^{-1} day^{-1}

365 = basis for calculating annual VS production, days yr^{-1}

$B_{o(T)}$ = maximum methane producing capacity for manure produced by livestock category T, m^3 CH_4 kg^{-1} of VS excreted

0.67 = conversion factor of m^3 CH_4 to kilograms CH_4

$MCF_{(S,k)}$ = methane conversion factors for each manure management system S by climate region k, %

$MS_{(T,S,k)}$ = fraction of livestock category T's manure handled using manure management system S in climate region k, dimensionless

Temperatura promedio utilizada para Jinotega-Esteli 23 °C

EF	1.4	
VS	2.9	Default data for LA
Tiempo en establo	60.83 dias/año	un ordeño, 4 h en promedio, estimación
Bo	0.13	Default data for LA
	0.67	
MCF	0.1	Default data for LA
MS	1	100% son digestores

UF_b Model correction factor to account for model uncertainties (0.94)[1]

EQUATION 10.22
CH_4 EMISSIONS FROM MANURE MANAGEMENT

$$CH_{4\,Manure} = \sum_{(T)} \frac{\left(EF_{(T)} \bullet N_{(T)}\right)}{10^6}$$

Where:

$CH_{4\,Manure}$ = CH_4 emissions from manure management, for a defined population, Gg CH_4 yr^{-1}

$EF_{(T)}$ = emission factor for the defined livestock population, kg CH_4 head^{-1} yr^{-1}

$N_{(T)}$ = the number of head of livestock species/category T in the country

T = species/category of livestock

Solo una categoria: animales hembra propósito leche

BEy (ton CO2 e/año)	424.7	
CH4 Manure	20.2	ton CH4
EF	1.4	
N	14	
PEy	42.5	
ERy	382.2	6,497.2 US$/año

Year	Producers (CPA's)	BEy(ton CO_2e)	PEy (tonCO_2e)	Ery (ton CO_2e)
2010	30	15924	1592	14332
2011	60	31849	3185	28664
2012	90	47773	4777	42996
2013	120	63698	6370	57328
2014	125	66352	6635	59717
2015	125	66352	6635	59717
2016	125	66352	6635	59717
2017	125	66352	6635	59717
2018	125	66352	6635	59717
2019	125	66352	6635	59717
2020	90	47773	4777	42996
2021	60	31849	3185	28664
2022	30	15924	1592	14332

	The data presented are tons of CO_2 and totals for all producers who are members of or active in the programme each year. There is a yearly increase of 30 producers who join the POA by 2014, for a limit of 60 kton CO_2e per annum, which defines the small–scale methodology as the ceiling. The POA goal is 470,000 tons of CO_2e in 13 years, considering 4 hours of stabling in the milking area, and the target would be 50% of this amount for a 2–hour stay for cows in the dairy. Estimates are entirely dependent on the time variable for cow stabling. *Therefore, for the purpose of initial estimates, the goal for this POA could be in the range of 235,000 to 470,000 tons of CO_2e during its estimated life.* The stabling time should be analyzed in detail during the formal stages of POA design.
BASELINE SCENARIO *Describe the situation in absence of the POA and of typical CPA activities to be included.* *No more than ¼ page*	Lacking the POA, the situation would remain the same as now. That is, solid and liquid wastes in dairies qualifying as CPA would be treated in pits and then sent to bodies of water or pastures without making the best use of them, and the status of innocuousness and dairy management would remain in very similar conditions. Note that the estimates assume that the base line contemplates deep pits and not direct dumping of wastes into the receiving body as occurs presently. The above is because the small–scale AMS III.D methodology would not apply for this condition, and makes the project use the AMS III.H methodology, which would give estimates of prevented methane, which are very low given the aerobic processes of dumping directly into the river. In other words, a dynamic base line is proposed in which POA participants who join begin a process of enhancing their facilities by installing treatment pits that are then converted into bio–digesters. This base line issue should be analyzed in detail during a subsequent stage of POA consideration. The main risk identified in the base line is recognition of the truly dynamic nature of waste treatment measures adopted under the conditions of rural applications of this type within the context of small producers.
WHAT ARE SOME OF THE ELIGIBILITY CONDITIONS FOR CPAS WHO JOIN THE POA?	• Deep waste–water treatment pits (over 2 m deep), with standing periods of over 45 days. • Covered areas for confined cow management during the milking process, with concrete slabs that facilitate waste channelling and handling in a suitable place for treatment. • Associated through a cooperative or second–tier organization. • The same type of facility / site as the typical CPA. • The problem of suitable waste management has not been solved. • Willingness to invest and commitment with this issue.
CONTEXT IN WHICH THE POA AND ITS TYPICAL CPA ACTIVITIES WILL BE	Dairy production in Nicaragua is the largest item in the primary sector of the economy. This activity represents 2 % of the GDP and has done so

CARRIED OUT *Describe in no more than ½ page*	consistently over the past decade. Note that this economic sector had a yearly average growth of 3 % over the same period. Nicaragua is a net exporter of dairy products and a regional leader, with 14 million gallons in production. One consequence of this growth is the pollution that this sector generates, which affects other sectors of the economy. Milk processing requires at least 2 litres of water for each litre of milk produced, meaning that the 258,000 metric tons produced in 2002 used and polluted some 500,000 metric tons of water. Public opinion, markets and regulations are more and more environmentally demanding, as seen in suits against polluters, higher prices for "green" products, and global developments in environmental law.
METHODOLOGY *Briefly describe if you know whether the approved CDM methodology would be applicable to the POA's typical CPA.* *Reference by methodology number and name.*	**AMS. III.D. Methane recovery in animal manure management systems, version 14.**

C. POA FINANCING

DEVELOPMENT COST ESTIMATES	
Development costs	Financing, funding and capacity building. Designing project implementation plan and institutional design: unknown
Installation costs (per CPA or per POA)	The programme's turn–key arrangement includes the following costs: Assessment of initial situation Checking CPA eligibility to participate in the POA Most suitable proposal (planning and design) Providing equipment with appropriate technology, shipment, insurance, installation, start–up, training in operation, supervising scheduled and contingency maintenance, for several years Operation conformity

BIODIGESTOR OF COW MANURE

Hours burner (1 unit)	Cattle***	Buckets of manure*	Buckets of water	Size of biodigestor (linear meter)	Price ($)
5	1	1	4	4	400
10	2	2	8	8	600
20	4	4	16	15	900
40	8	8	32	30	1600

* Buckets of 20 liters or 5 gallons capacity

**Animals with a weight of 400kg (or more) or 880 pounds (or more)

Considerations:

1. Tubular plastic continual–flow bio–digester
2. Costs validated by the municipalities of Jinotega and San Rafael
3. Costs for stoves at 15 meters from bio–digester
4. Includes stove with 2 burners and grills
5. Includes pipes for transporting gas
6. Main valves
7. Calibre 8 plastic with UV protection and green pigmentation
8. The producer helps with pit digging and earth moving
9. *Llama Sana* assumes the technical direction for all excavation and construction.
10. Relationship formalized under contract
11. Soils for bio–digester construction must not have rocks and should be clayey.
12. Costs do not include investment estimates for monitoring equipment.

Other costs

Technical–administrative coaching, follow–up and annual monitoring, etc.: US$ 100 per year. Measuring CO_2 emissions reductions with input from the validation and verification process, and the procedure to obtain the CERs.
Producer's operation: unknown at the time of this PIN.
Infrastructure maintenance: unknown at the time of this PIN.

Total costs

An initial estimate of the total POA costs is shown in the table below. Note that project financing and funding negotiations, risk analysis and required structures are in the development process.

Year	Producers	Cost of preparation of AOP (US$)	Investment cost for each CPA (US$)	Operating and administrative cost (US$)	Total cost (US$)
2009	0	20.000	0	0	200,000
2010	30	0	180,000	75,000	255,000
2011	60	0	180,000	75,000	255,000
2012	90	0	180,000	75,000	255,000
2013	120	0	180,000	75,000	255,000
2014	125	0	30,000	75,000	105,000
2015	125	0	0	75,000	75,000
2016	125	0	0	75,000	75,000
2017	125	0	0	75,000	75,000
2018	125	0	0	75,000	75,000
2019	125	0	0	75,000	75,000
2020	90	0	0	75,000	75,000
2021	60	0	0	75,000	75,000
2022	30	0	0	75,000	75,000
Approximate total cost					**1,925,000**

SOURCES OF FINANCING IDENTIFIED FOR THE POA	
Describe the POA financial / intervention structure, and any relevant data on the economic / financial context that might help to evaluate the proposed arrangement.	The current conditions for dairy farmers in Nicaragua (market, prices, incentives, world situation, and institutional support) do not permit them to propose major enhancements related with the POA objectives. The project identifies a potential monetization for emissions reduction, which once materialized could provide the backing needed to ensure financial resources and the economic and technical feasibility for producers to begin the improvement process, starting with wastes and moving on to milk productivity and quality. With Programmatic CDM POA cost benefits, funded 100 % with the participation of financial organizations and banks over an average period of 5 years, with financial alternatives due to CERs and partial assignment of carbon credit entitlements, obtained by certifying CO_2 reductions.
IDENTIFIED SOURCES OF CARBON FINANCING *Describe your familiarity or contacts with sources of carbon financing in relation to the proposed POA.*	No source of carbon financing has been identified and proposed.
INDICATIVE CER PRICE PER TON CO_2 EQUIVALENT THAT YOU ARE CONSIDERING FOR THIS POA	€11 / ton CO_2 e
TOTAL ESTIMATED VALUE OF THE CARBON CONTRIBUTION TO THE POA	
Over a period until 2012 (end of first Kyoto Protocol compliance period)	€ 0.75 million, equivalent to US$ 1.15 million
Over the life of the POA	€ 5 million, equivalent to US$ 7.7 million

D. ENVIRONMENTAL AND SOCIAL BENEFITS

LOCAL BENEFITS	• Water conservation • Preventing desertification by taking advantage of the fertilizer value of the by–products. • Reducing bad odours. • Vector control • Developing values and practices to ensure innocuous milk and enhanced competitiveness in the dairy sector. • Job creation • Training and Technology Transfer • Infrastructure for the waste water treatment system • Substituting firewood with biogas Firewood is commonly used in rural Nicaragua, but is now harder to find, costs more, is brought from further way, and is associated with diseases such as cancer, blindness and respiratory illness. It especially affects the newly–born.

<table>
<tr><td></td><td>
There is a wide range of uses for biogas that support local processes that are important to the rural populations of Nicaragua.
<table>
<tr><th>Equipment</th><th>Biogas consumption m3/h</th></tr>
<tr><td>Kitchen stove</td><td>0.150 – 0.200</td></tr>
<tr><td>Firebox to cook food of fruits</td><td>0.300</td></tr>
<tr><td>Gas lamp equivalent to a light bulb of 60W</td><td>0.100</td></tr>
<tr><td>Heaters for stuckling pigs or for pigs breeding</td><td>0.250</td></tr>
<tr><td>Heaters for chicken breeding</td><td>0.150</td></tr>
<tr><td>Freezer for ammoniac absorption</td><td></td></tr>
<tr><td>Biogas – diesel engine per b.h.p.</td><td>0.420</td></tr>
<tr><td>Production of 1 kWh of electric power with a blend of biogas diesel</td><td>0.700</td></tr>
</table>
</td></tr>
<tr><td>GLOBAL BENEFITS</td><td>It will contribute to reducing world–wide CO_2 emissions.</td></tr>
<tr><td colspan="2">SOCIO–ECONOMIC ASPECTS</td></tr>
<tr><td>What positive or negative socio–economic aspects can be attributed to the POA and would not have occurred without the intervention? Indicate the number of persons / communities that will benefit from the POA</td><td>Preserve and improve a very significant activity for Nicaragua, household savings by using gas from the bio–digester stated as saved firewood, enhanced health and living conditions.
No negative social or economic impacts are anticipated:
The possibility of using this project as a case for study and research by the universities and the sector.
Broadcasting values relating to environmental protection and conservation.
Economic development due to the creation of sources of jobs in the programme.</td></tr>
<tr><td>What direct effects might the POA have (employment, access to flows of funds, etc.)?</td><td>Direct effects:
Financial flows stated as an improved profitability balance from the activity, taking into account the environmental externalities of production.</td></tr>
<tr><td>What are the possible other effects (training, education, introduction of new practices and products, or effects that the POA might have on other sectors)?</td><td>Training,
Education,
Introduction of new practices, and
Novel technological and administrative outcomes</td></tr>
</table>

LEGAL AND REGULATORY STRATEGIES AND PRIORITIES OF THE COUNTRY, INCLUDING ENVIRONMENTAL Describe consistency with the country's legal and regulatory frameworks, compliance with environmental standards and requirements, and other strategies of the country.	One of the priorities that will prevail in this project is implementing better waste–water management in the dairy, which will help to comply with the applicable environmental laws and standards. We esteem that the project is consistent with: 1. Achievement of applicable national policies and strategies, such as the Strengthened Strategy for Economic Growth and Poverty Reduction, National Energy Policy (Decree 13–2004), and the National Development Plan. 2. Nicaragua's 2001–2006 Environmental Plan (PANIC from the Spanish), the National Action Plan to Address Climate Change, the National Biodiversity Strategy, the Water Resource Plan, and other binding national strategic instruments relating to economic issues. 3. Adoption of environmentally friendly technologies and generation of knowledge regarding them and their best practices. 4. Utilization of renewable and/or alternative sources of autochthonous energy. 5. Creation of new jobs. 6. Pollution abatement. The applicable guidelines are: Law No. 217: *Ley General del Medio Ambiente y los Recursos Naturales* *Permiso Ambiental y Norma Técnica de Control ambiental para Procesadoras de productos Lácteos* Law No. 620–2007: *Ley General de Aguas Nacionales* Law No. 297: *Ley General de Agua Potable y Alcantarillado Sanitario* Approval of concessions or authorizations to use the water Law No. 225: *Ley Especial de Delitos contra el Medio Ambiente y los Recursos Naturales* Decree No. 9–96: *Reglamento de la Ley General del Medio Ambiente y los Recursos Naturales* Decree No. 33–95: *Disposiciones para el Control de la Contaminación Proveniente de las Descargas de Aguas Residuales, Domésticas, Industriales y Agropecuarias* Decree No. 432–89: *Reglamento de Inspección Sanitaria* Decree No. 76–2006: *Sistema de Evaluación Ambiental* Decree No. 394: *Disposiciones Sanitarias* Ministerial Resolution No. 04–2000, Art. 4.1 defines the component of the Gradual Decontamination Plan for dumped fluids in accordance with what is established in Decree No. 33–95 and the Water Use Reduction Plan developed for the industrial sector. NTON 05 014–02: *Norma Técnica Obligatoria Nicaragüense Ambiental para el Manejo, Tratamiento y Disposición Final de los Desechos Sólidos no Peligrosos*

	International Standards (HACCP, SSO and BPM) *Reglamento Ley Básica de Salud Animal y Sanidad Vegetal* Municipal permit

4.- Participation in the Programmatic CDM Training Course held in Nicaragua

The technical assistance offered while implementing this project in Nicaragua included participating in a Programmatic CDM workshop organized in Managua on June 23 and 24, 2008, by the Nicaraguan CDM Designated National Authority within the CD4CDM capacity–building project. This activity was supported through the joint efforts of OLADE and UNEP Risoe.

A presentation was given on Lessons Learned from the Programmatic CDM, in addition to helping to facilitate a session on the topics of rural energy, energy efficiency, and waste management for cleaner production.