Japan International Cooperation Agency (JICA)
National Council for Climate Change and Clean Development Mechanism (CNCCMDL)

The Study for the Promotion of CDM Projects in the Dominican Republic

THE DOMINICAN REPUBLIC NATIONAL ACTION PLAN FOR CDM PROJECT DEVELOPMENT

FINAL REPORT
ANNEX I
TOOLS FOR CDM PROJECT DEVELOPMENT

December 2010

Japan International Cooperation Agency

EX CORPORATION

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JR
10-133

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This is the ANNEX I.

The currency exchange rate used in this report is as follows.

U$1.00= JP¥91.10.

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1. Summary of the Tools for CDM Project Development

Summary
of
the Tools for CDM Project Development

1 PINs and Model PDDs

To encourage and facilitate CDM project development in the Dominican Republic, the Study produced several Project Idea Notes (PINs) and model Project Design Document (PDD) for the potential areas/sectors. This section outlines the process of selecting the areas sectors and project prototypes of CDM in the course of the Study. The original PINs and model PDDs produced are available in ANNEXES of this report.

1.1 Identification of Potential Projects

As a starting point of identifying the potential projects of CDM, JICA Study Team (JST) presented the potential sectors and types of projects considered to be developed as CDM in the Dominican Republic based on the information and materials obtained before this study visit. The table below shows the potential sectors and type of projects and potentials analyzed by JST.

Table 1-1: Preliminary Analysis of Potential Sectors/Projects Types of CDM

Potential Sector/Sub-Sector	Current Status
A. Renewable Energy Sector	
Wind Power	♦ Potential study was carried out by the United States. The estimated total potential was more than 10 thousand MW. ♦ One project has already been registered at CDM Executive Board while the others still in the stage of PINs or plans.
Micro Hydropower	♦ State-Owned Hydropower Authority made a list of potential micro hydropower projects for their bidding as CDM projects.
Other Renewable Energy	♦ USAID provided assistance for development of micro renewables for 5 years until Sept. 2008. Renewables include bio-digester, wind power, and solar power ♦ Those project plans has never been considered as CDM projects.
B. Agriculture	
Sugar production	♦ Energy saving in sugar factory ♦ Project plan exists, but no effort of application for CDM project.
Bio-fuel (Bio-Ethanol) Production from sugarcane	♦ PIN or project plan may exist.
Methane capture and energy utilization from piggery (anaerobic fermentation of pig manure)	♦ Pilot plant exists according to information.
Community-based bio-diesel production from Jetropha	♦ Detail unknown
C. Waste Management	
Methane capture and energy	♦ CDM project plan exists.

production	
Methane emission reduction by semi-aerobic landfill operation	♦ JICA currently provides assistance. Now under trial of registering the project as CDM.
Methane emission reduction by composting of organic waste	♦ No project planned
D. Industry	
CO_2 reduction in cement industry	♦ PIN is now under preparation by cement industry
E. Transport	
Public Transportation (Metro)	♦ Under consideration
Fuel switch of motor vehicles (from LPG to CNG)	♦ Under consideration
Introduction of bio-fuel for automobiles	♦ Under consideration
F. Residential and Commercial (Demand Side Management)	
Introduction of solar water heater (conversion from electricity to solar energy) in hotels	♦ Under consideration
Energy saving of light bulbs	♦ PIN under preparation

On the other hand, ONMDL presented the current status of CDM projects by showing the following CDM project portfolio outlining the CDM project now under preparation of PIN or PDD.

Table 1-2: CDM Project Portfolio under Preparation of PIN or PDD (September 2008)

Sector	Project Proponent	Project Outline
Ethanol	Dominican Forbes Energy	Generation with Biomass and Ethanol Production
Ethanol	Ammadol	Ethanol Production from Beet Plantation
Methane	North Santo Domingo City Hall	Methane Capture Project in the Duquesa Sanitary Landfill
Methane	Chamber of Commerce of San José de Ocoa	Methane Capture Project in Sanitary Landfill
Methane	SANUT	Methane Capture Project from swine residues
Wind Power	EGE Haina	Various Wind Power Projects
Hydropower	Rafael Beriguete	Various Hydropower Projects
Fuel Switch	EGE Haina	Fuel Switch Project from Bunker to LNG
Fuel Switch	EGE Haina	Fuel Switch Project from Oil to LNG
Bio-fuel	IDDI	Bio-diesel Production
Bio-fuel	IDDI	Biomass Power Generation and Ethanol Production
Bio-fuel	Dominican Induspalma Mercasil Group	Methane Capture and Power Generation from Palm Oil Effluent
Cement	Dominica CEMEX	Use of Fly Ash for Clinker Production in Cement Industry
Multiple Sector	Vicini Group	Multiple Projects including Wind, Bagasse and Cattle.

These information and data presented by JST and ONMDL are compiled into the primary list of potential project for CDM as shown in the next table.

Table 1-3: Primary List of Potential CDM Projects in the Dominican Republic

Areas/Sectors	Types of CDM Projects
Renewable Energy	▪ Wind power ▪ Hydropower ▪ Biomass Power
Fuel Switch	▪ Fuel switch in power generation (from oil to natural gas)
Agriculture	▪ Methane capture and utilization in pig farms ▪ Bio-diesel production of Jatropha curcas ▪ Ethanol production from sugarcane
Industry	▪ CO_2 emission reduction in cement industry (Increased use of fly ash in clinker production) ▪ Energy efficiency improvement in sugar industry ▪ Methane capture and utilization in palm oil industry ▪ Bio-diesel production from biomass sources ▪ Ethanol production from biomass sources
Waste Management	▪ Landfill methane capture and utilization ▪ Methane avoidance by semi-aerobic treatment of waste at final disposal landfill ▪ Methane avoidance by composting of organic waste
Transport	▪ Introduction of public transport system (subway) ▪ Fuel switch (from gasoline/diesel oil to compressed natural gas: CNG) ▪ Introduction of bio-diesel as motor fuel
Residential/Business/ Commercial	▪ Introduction of solar water heater in hotels and buildings ▪ Introduction of efficient lighting (Conversion from incandescent lamp to florescent bulb)

1.2 Selection of PIN/Model PDD Preparation Projects

1.2.1 Selection Process

Selection of PIN and model PDD preparation projects was made in accordance with the selection flow shown in the figure on next page.

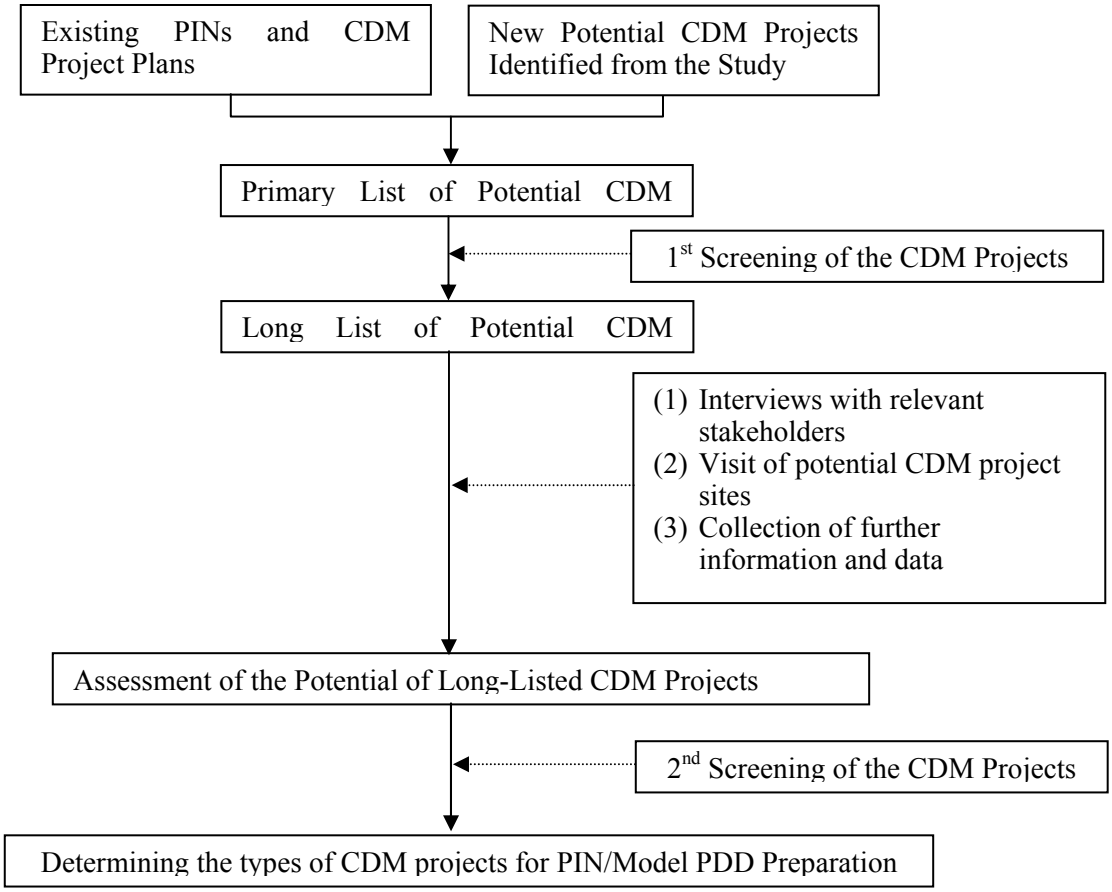


Figure 1-1: Flow of Selecting the CDM Project for PIN Preparation

1.2.2 Selection Criteria

Based on the explanation and agreement made in the meeting of Inception Report, the following criteria are adopted for 1st screening and 2nd screening of the projects to determine the PIN preparation.

Table 1-4: The Criteria for Selection of CDM Projects for PIN Preparation

Screening	Criteria	Parameters
1st Screening	Consistency with sustainable development of the country	♦ GHGs emission reduction effect ♦ Other potential socio-economic and environment benefit
	Consistency with the national development priority	♦ Consistency with national development policies ♦ Consistency with sectoral development priority
	Eligibility of the Project as CDM	♦ Additionality ♦ Non-diversion of Official Development Assistance

Screening	Criteria	Parameters
	Concreteness of the Project	♦ Identified location of the project ♦ Determination of the project owner ♦ Specified project profile
2nd Screening	Feasibility of the Project	♦ Maturity of the project (e.g. Detail preliminary survey conducted; Project plan prepared, etc.) ♦ The methodology applied in the Project has already been prepared or approved methodology available. ♦ Strong intent of project owners to implement the project ♦ The project estimates the accurate estimation of cost and implementation period (construction and operation) ♦ Early implementation and acquisition of CER ♦ Application of proven technologies ♦ Sufficient data and information to evaluate financial feasibility of the project ♦ Sufficient data and information to estimate GHGs reduction from the project

Based on the result of 1st screening process, the Study prepared some PINs for selected potential CDM projects in cooperation with ONMDL and local consultants hired by the Study. In between the 1st and 2nd screening, JST and ONMDL conducted the interview with the relevant stakeholders, potential project sites visits, and collection of further information and data to determine the potential CDM projects to be selected for preparation of model PDDs based on the 2nd screening process. The results of 1st and 2nd screening activities are respectively shown in the following tables.

Table 1-5: Result of the 1st Screening of Potential CDM Projects

Potential CDM Projects	Screening Criteria				Result
	Compatibility with Sustainable Development	Compatibility with National Development Policies	Eligibility as CDM Project	Concreteness of the Project	
Wind Power	O	O	O	O	O
Hydropower	O	O	O	O	O
Biomass Power	O	O	O	O	O
Fuel Switch in Power Generation	O	O	X	O	X
Methane Capture and Utilization in Pig Farms	O	O	O	O	O
Bio-Diesel Production from Jatropha Curcas	O	O	O	X	X
Ethanol Production from Sugarcane	X	O	X	O	X
CO_2 Emission Reduction in Cement Industry	O	X	O	O	X
Energy Efficiency Improvement in Sugar Industry	O	O	O	O	O
Methane Capture and Utilization in Palm Oil Industry	O	O	O	O	O
Bio-Diesel Production from Biomass Sources	X	O	X	O	X
Ethanol Production from Biomass Sources	X	O	X	O	X
Landfill Methane Capture and Utilization	O	O	O	O	O
Methane Avoidance by Semi-Aerobic Treatment of Waste at Final Disposal Site	O	O	O	O	O
Methane Avoidance by Composting of Organic Waste	O	O	O	O	O
Introduction of Public Transport System (Subway)	O	O	O	O	O
Fuel Switch in Motor Vehicles	O	O	O	O	O
Introduction of Bio-Diesel for Motor Vehicles	O	O	X	X	X
Introduction of Solar Water Heater in Hotels and Buildings	O	O	O	O	O
Introduction of Efficient Lighting (from Incandescent to florescent bulb)	O	O	O	O	O

- Fuel switch in power generation is excluded because it has already been included as a part of national power development plan and will be difficult to demonstrate its additionality.
- The projects in relation to bio-diesel and ethanol production are excluded in consideration of the international dispute that fuel use of food crops may hinder stable food supply in the world. In the case of Jatropha Culcas, although it is not food crops, the Study could not identify the actual potential project locations of implementing such project.
- The project in cement industry is excluded as the fly ash cement is not complied with quality standard of cement in the Dominican Republic. However in 2010, the quality standard is modified and the project is currently promoted by the cement industry (CEMEX) as CDM project.

Table 1-6: Result of the 2nd Screening of Potential CDM Projects

Potential CDM Projects	Screening Criteria			Result	Reasons for Exclusion
	Viability	Replicability	Market Needs		
Wind Power	O	O	O	X	▪ Since there is one registered project that can be referred for development of similar CDM projects; therefore, it is not necessary to produce PINs and model PDDs.
Hydropower	O	O	O	O	
Biomass Power	O	O	O	O	
Methane Capture and Utilization in Pig Farms	O	O	O	O	
Energy Efficiency Improvement in Sugar Industry	O	X	X	X	▪ Due to conversion to production of ethanol and bio-diesel in sugar industry, the market needs and replicability of this CDM project is not high
Methane Capture and Utilization in Palm Oil Industry	O	X	X	X	▪ The number of Palm oil industry is limited while the relevant industries has enough capability of developing CDM projects by themselves.
Landfill Methane Capture and Utilization	O	O	O	X	▪ Since one landfill methane capture project is in the process of developing a PDD, the Study excluded preparation of model PDD for this type of project.
Methane Avoidance by Semi-Aerobic Treatment of Waste at Final Disposal Site	O	O	O	X	▪ Another JICA Project is currently in process of developing this project under CDM.
Methane Avoidance by Composting of Organic Waste	O	O	O	O	
Introduction of Public Transport System (Subway)	O	X	X	X	▪ As to subway project, relevant organizations are in the process of developing it as CDM project while replicability of similar project is low within the country.
Fuel Switch in Motor Vehicles	X	O	X	X	▪ Maturity of project is low and estimated difficult to develop it as CDM project within the limited time.
Introduction of Solar Water Heater in Hotels and Buildings	X	O	X	X	▪ Maturity of project is low and estimated difficult to develop it as CDM project within the limited time.
Introduction of Efficient Lighting (from Incandescent to florescent bulb)	X	O	X	X	▪ Maturity of project is low and estimated difficult to develop it as CDM project within the limited time.

1.2.3 Potential Projects Selected for Preparation of Model PDDs

Through a series of selection process mentioned above, the following potential sectors and projects were selected for preparation of model PDDs.

- Hydropower
- Biomass power generation
- Methane capture and utilization in pig farms
- Methane avoidance by composting of organic waste

The model PDDs for the above potential CDM projects is available in this ANNEX. These model PDDs are prepared for the use by the potential CDM project proponent to understand the contents of PDDs required for registration under CDM. It also provides examples of GHGs reduction estimation for each type of CDM projects based on the assumption of project profile and outline. Such information can help estimating the potentials of GHGs emissions reduction and carbon credit from the projects that proponents plan to carry out.

2 National CDM Website

As the national information platform of CDM in the Dominican Republic, the Study Team and Dominican counterparts working together with local consultant hired by Study developed the National CDM Website within the webpage of CNCCMDL. The CDM was first launched in February 2009. It has been periodically updated of contents while the activity output of the Study was also uploaded for their dissemination to the public. The website will be continuously maintained by the officer in charge at ONMDL, CNCCMDL after the project. The figure below shows the page view of website (at http://www.cambioclimatico.gob.do/).

Figure 2-1: Page View of the Dominican Republic National CDM Website

3 CDM Project Formulation Manual

The CDM Project Formulation Manual is prepared in Spanish for the use by the potential project proponents as the guidebook for CDM project development. Based on the reviews and discussions about the contents, the manual is finalized with the contents outlined in the table below.

Table 3-1: Contents of CDM Project Formulation Manual

1. Introduction to CDM
1.1 What is CDM?
1.2 Key Concepts of CDM
1.3 CDM Institutions
1.4 CDM Typology
1.5 CDM Project Cycle
1.6 Costs related to CDM project cycle
1.7 Recent Status of CDM
2. Project Design Document
2.1 Overview of the PDD
2.2 Contents of the PDD
2.3 A/R CDM Project Activities: Technical Aspects

This manual will be periodically reviewed and updated by ONMDL, CNCCMDL to provide potential CDM project proponents with the latest technical information and data on CDM project documentation. The complete document of this Manual is available in this ANNEX.

4 National CDM Portfolio

The Study produced the national CDM portfolio of the Dominican Republic based on the CDM project proposals submitted to ONMDL in the form of PINs and/or PDDs for the purpose of promoting the proposed CDM projects to potential investors, financiers and buyers of CERs at domestic as well as international levels. The portfolio is uploaded to the Dominican Republic CDM website so that any interested individuals or parties can access the latest information and details of the CDM projects proposed in this country.

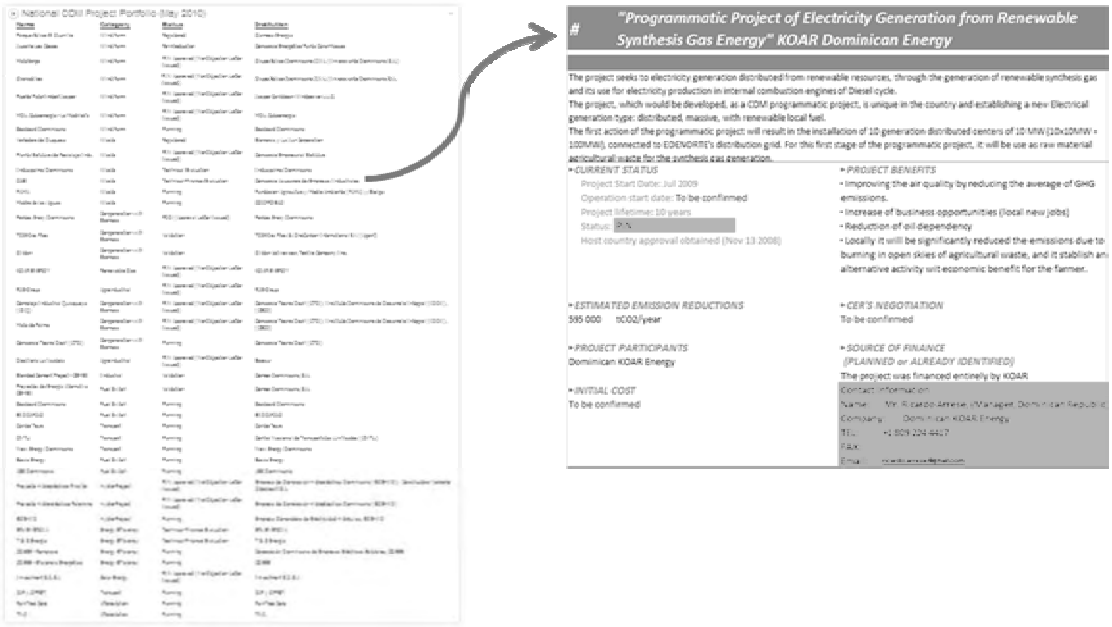
4.1 Basic Structure of the National CDM Portfolio

The national CDM portfolio currently uploaded in the Dominican Republic CDM website is as shown in the figure below.

Figure 4-1: Page View of the National CDM Portfolio on the CDM Website

The CDM portfolio is first given on the website in the form of the list of CDM projects recognized by ONMDL, DNA of the Dominican Republic. There are currently 40 projects listed in this portfolio.

In addition, the project details and information on the latest update are also available for each of the listed CDM projects in the format as shown in the next figure.



"Programmatic Project of Electricity Generation from Renewable Synthesis Gas Energy" KOAR Dominican Energy

The project seeks to electricity generation distributed from renewable resources, through the generation of renewable synthesis gas and its use for electricity production in internal combustion engines of Diesel cycle.
The project, which would be developed, as a CDM programmatic project, is unique in the country and establishing a new Electrical generation type: distributed, massive, with renewable local fuel.
The first action of the programmatic project will result in the installation of 10 generation distributed centers of 10 MW (10x10MW = 100MW), connected to EDENORTE's distribution grid. For the first stage of the programmatic project, it will be use as raw material agricultural waste for the synthesis gas generation.

►CURRENT STATUS
Project Start Date: Jul 2009
Operation start date: To be confirmed
Project lifetime: 10 years
Status: [illegible]
Host country approval obtained (Nov 13 2008)

►PROJECT BENEFITS
- Improving the air quality by reducing the average of GHG emissions.
- Increase of business opportunities (local new jobs)
- Reduction of oil dependency
- Locally it will be significantly reduced the emissions due to burning in open skies of agricultural waste, and it stablish an alternative activity with economic benefit for the farmer.

►ESTIMATED EMISSION REDUCTIONS
595 000 tCO2/year

►CER'S NEGOTIATION
To be confirmed

►PROJECT PARTICIPANTS
Dominican KOAR Energy

►SOURCE OF FINANCE
(PLANNED or ALREADY IDENTIFIED)
The project was financed entirely by KOAR

►INITIAL COST
To be confirmed

Contact Information
Name: [illegible]
Company: Dominican KOAR Energy
TEL: +1 809 224 4417
FAX:
Email: [illegible]

Bionersis project on La Duquesa landfill, Dominican Republic

The project activity is to build, operate and maintain a landfill gas (LFG) collection and flaring system on La Duquesa landfill in Santo Domingo, Dominican Republic. The equipment includes inter alia a gas collection network, an extraction and flaring station including high temperature enclosed flare and monitoring and control systems. Possible uses for LFG include electricity generation for use at the landfill site and/or supply to the local grid. The energy plant, consisting of a pre-treatment system and electricity generators, would then be installed once the feasibility of electricity generation will be fully demonstrated by operational proofs.
It is estimated that the project will achieve emissions reductions of more than 3,928,699 tCO2e over the period 2009 – 2019.

►CURRENT STATUS
Project Start Date: Jan 15 2009
Operation start date: To be confirmed
Project lifetime: 15 years
Status: Registered
Host country approval obtained (Nov 17 2008)

►PROJECT BENEFITS
· Reduction of pollution caused by saw dust dumping (affecting local communities, damaging mangrove)
· Increase of business opportunities (new jobs, cost saving)
· Reduction of oil dependency
· Environmentally friendly technology transfer

►ESTIMATED EMISSION REDUCTIONS
345,174 tCO2/year

►CER'S NEGOTIATION
To be confirmed

►PROJECT PARTICIPANTS
Bionersis S.A
Sociedad para el Desarrollo Limpio en America Latina
LA Global Carbon Trading Company Limited

►SOURCE OF FINANCE
(PLANNED or ALREADY IDENTIFIED)
To be confirmed

►INITIAL COST
LKR 69 million (xx USD)

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Email: Bertrand.courcelle@bionersis.com

Figure 4-2: Project Information Available in the National CDM Portfolio

4.2 CDM Project Development in the Current National CDM Portfolio

Reviewing the current national CDM portfolio, there are 2 (two) registered CDM projects in the Dominican Republic, i.e. one wind power project and one landfill methane capture project. However, the first registered wind power project has not been implemented so far and is currently reintroduced in the different location while the landfill methane capture project is about to start its full-scale project operation. In addition, there are 4 (four) CDM projects now under validation by the relevant DOEs (Designated Operation Entities) to apply for registration while the remaining 34 CDM projects are under preparation of PDDs or PINs as shown in the table below.

Table 4-1: CDM Project Development Status in National CDM Portfolio

Development Status	Number of Projects	Estimated CERs (tonsCO_2/yr)
Registered CDM Projects	2	465,876
CDM projects at Validation	4	466,504
CDM projects under PDD preparation (PIN Prepared)	13	1,224,898
CDM Projects under PIN preparation	21	8,390,217
Total	40	10,547,495

Most of the projects are still in the early stage of CDM project development. Even if all the projects currently under PDD preparation are registered and implemented, the estimated total CERs will be more or less 2 million tons of CO_2 equivalent.

In terms of the sectors and areas, the composition of the projects in the national CDM portfolio is illustrated as shown in the table below.

Table 4-2: Composition of CDM Projects in National CDM Portfolio by Sectors/Areas

Sectors/Areas	**Number of Projects**	**Estimated CERs (tonsCO_2/yr)**
Energy Industries	**23**	**3,179,556**
Renewable Sources	20	2,479,556
Non-Renewable Sources	3	700,000
Other Energy Related	**4**	**157,000**
Industry	**2**	**276,725**
Agriculture	**1**	**6,000**
Transport	**4**	**210,000**
Waste Handling and Disposal	**4**	**432,977**
Afforestation and Reforestation	**2**	**6,401,000**
Total	**40**	**10,547,495**

Although the afforestation and reforestation projects totally estimate the CER as around 6.54 million tons of CO_2, they are still in the early stage of CDM project development without any

PDD preparation. It is difficult to consider that they can be registered and implemented before the year 2012. Most of the projects that are matured with preparation of PDDs and/or at validation stage come from energy, industry and waste management sector. The country has to promote CDM projects in the sectors and areas where the projects can be realized within the short-term by 2012.

The complete list of CDM projects recognized by ONMDL, CNCCMDL is shown in the next table.

Table 4-3: The Current List of CDM Projects in the National CDM Portfolio

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
1	Renewable Sources	Wind Farm 64MW	Construction, installation and start-up of the wind generators with 850 kW of power by wind generator, triple-blade rotor and asynchronous generator of four poles, constitute the best technology for optimal use of the existing resources. Wind Farm El Guanillo	Registered	115.879	Gamesa energy
2	Renewable Sources	Cogeneration with Agro forestry Residues	Use and energy appreciation from agricultural waste (rice husk, coconut waste and other. Textile Offshore Site Dominican (TOS-2Rios)	In validation process, In Evaluation of the PDD	150,000	TOS-Dos Rios & One Carbon International B.V. (Agent)
3	Renewable Sources	Wind Farm 25.2MW	Wind project of 25.2 MW, Los Cocos	Reintroduction	51,000	Consortium Energetic Punta Cana-Macao and EGE-Haina
4	Renewable Sources	Steam Generation from Biomass	Fossil fuel switch by biomass for steam generation.	In validation process, In evaluation of the PDD	39,779	Gildan Activewear, Textile Company Inc.

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
5	Renewable Sources	Gasification of biomass residues	Programmatic project of electricity generation with gasification of renewable biomass, 100 MW.	PIN Approved (No-Objection Letter Issued)	500,000	KOAR ENERGY
6	Renewable Sources	80MW Hydro Generation	Small-scale hydro project, Palomino Hydropower Project	PIN Approved (No-Objection Letter Issued)	72,416	Empresa de Generacion Hidroelectrica Dominicana (EGEHID)
7	Renewable Sources	Photovoltaic Program	Electricity generation through photovoltaic modules. Program FV DR	PIN Approved (No-Objection Letter Issued)	14,000	Investment S.C. S.A
8	Renewable Sources	Generation through Biomass residues	Electricity generation through Biomass residues . RJS-Group	PIN Approved (No-Objection Letter Issued)	200,000 aprox.	RJS Group, SA.
9	Renewable Sources	Cogeneration (Steam and electricity consuming industrial facility, with the possibility of import the surplus of energy of the national grid 10 MW	Cogeneration with sugarcane bagase and injection to the grid in in distillery. Complejo Industrial Quisqueya (CIQ)	PIN Approved (No-Objection Letter Issued)	44,449	Consorcio Tecno Deah (CTD)/ Instituto Dominicano de Desarrollo Integral (IDDI), (CBCX)
10	Renewable Sources	Cogenerate energy (Steam and electricity) from sugar cane baggase and other biomass resulting of the operation of the Mata de Palma's sugarcane mill.	Cogeneration with sugarcane bagase and injection to the grid 4.7 MW. Ingenio Comunitario Mata de Palma	PIN Approved (No-Objection Letter Issued)	16,492	Consorcio Tecno Deah (CTD)/ Instituto Dominicano de Desarrollo Integral (IDDI), (CBCX)

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
11	Renewable Sources	Wind Generators of 850KW	Installation of 40 wind generators of 850 KW, of power (electric sub-stations and others). Matafongo Wind Farm	PIN Approved (No-Objection Letter Issued)	62,765	Grupo Eólico Dominicano C X A. (Inveravante Dominicana S.A.
12	Renewable Sources	Wind Generators of 850KW	Installation of 40 wind generators of 850 KW, of power (electric sub-stations and others). Granadillos Wind Farm	PIN Approved (No-Objection Letter Issued)	65,178	Grupo Eólico Dominicano C X A. (Inveravante Dominicana S.A.
13	Renewable Sources	50MW Hydro Generation distributed in two Pelton vertical axis units of 25 MW	Small-scale hydro project, Pinalito Hydropower Project	PIN Approved (No-Objection Letter Issued)	97,820	Empresa de Generación Hidroelectrica Dominicana (EGEHID)/ Contructora Norberto Odebrecht S.A
14	Renewable Sources	Generation through Biomass residues	Fossil Fuel Switching by biogas and biomass. Destileria La Isabela	PIN Approved (No-Objection Letter Issued)	27,000	Ecosur
15	Renewable Sources	Wind Generators of 115KW	Installation of 58 turbine of 2Mw of power with 80 mts height, (electric sub-station. Puerto Plata-Imbert Wind Farm.	PIN Approved (No-Objection Letter Issued)	65,178	Jasper Caribbean Wind power L.L.C.

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
16	Renewable Sources	Wind Generators of 10 KW	Installation of 10 wind-generators of 1000 kW each, if the measurements are above could vary the power of the machines. La Madrileña Wind Farm	PIN (in evaluation)	19,600	MDL Cuba energia
17	Fuel switch	Fuel switch HFO by Gas Natural	Replacement of HFO Nº6 by Natural Gas. 112 MW	Planning	200,000	Seaboard Dominicana
18	Renewable Sources	Wind Farms	Wind Farm of 100 MW	Planning	300,000	Seaboard Dominicana
19	Renewable Sources	Fuel switch from diesel by Renewable Biomass. 1 MW	Diesel switch by renewable biomass production plant of cocoa.	Planning	6,000	BIOCAFCAO, SA
20	Non renewable sources	Fuel switch HFO by Natural Gas	Replacement of HFO Nº6 by Natural Gas. 300MW	Planning	500,000	Basic Energy
21	Fuel switch	Fuel switch from diesel by Natural Gas. PoA	Programmatic project of switching diesel by Natural Gas in heat generation and electricity in Industry and Hotel Sector.	Planning		AES Dominicana

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
22	Renewable Sources	Wind Farms	Wind project of 25.2 MW, Quilvio Cabrera	Reintroduction	16,000	Consortium Energetic Punta Cana-Macao and EGE-Haina
23	Renewable Sources	119 MW in hydro generation	5 Hydro projects of small-scale and 2 of large-scale	Planning	616,000	Empresa Generadora de Electricidad Hidráulica, EGEHID
24	Energy Efficiency y Renewable Energy	Energy Efficiency Measures and Renewable Energy	Energy Efficiency Projects	Technical-finance evaluation	34,000	Energias Renovables Alternativas
25	Energy efficiency	Replacement of T12 and T8 lightning by T5	Replacement 150,000 low-efficiency bulbs by high efficency bulbs in public buildings	Planning	33,000	Corporación Dominicana de Empresas Eléctricas Estatales, CDEEE
26	Energy Efficiency improvement	Energy Efficiency by smart devices or replacing high comsumption appliances	Energy Efficiency Measures in Hotels, through the installation of smart devices in rooms and replacement of individuals A/C units by Chillers	Technical-finance evaluation	40,000	T & S Energia
27	Energy efficiency	Improvement of the efficiency of electricity distribution	Compensation of the reactive power	Planning	50,000	CDEEE
28	Industrial	Increasing of additions in the cement production	Addictions use to reduce the percentage of clinker in cement production. Blended cement project.	Validation	127,836	Cemex Dominican, S.A.

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
29	Fuel switch	Fuel Switching	Use of alternative fuel and biomass in cement furnaces. CEMEX Dominican: Alternative fuels and biomass project at San Pedro Cement Plant	Validation	148,889	Cemex Dominican, S.A.
30	Massive Transport of Passengers	Metro of Santo Domingo	Massive Transport of Passengers of the 1, 2 y 3 lines, of Santo Domingo's City	Planning	150,000	CAF y OPRET
31	Transport	Fuel switching in inter-urban transport unit of passengers	Fuel switch in vehicle units using diesle to another less carbon-intensive fuel	Planning		Caribe Tours
32	Transport	Fuel switching in inter-urban transport unit of passengers	Fuel switch in taxis and buses of the urban transport from Gasoline/diesel to Natural Gas	Planning		Central Nacional de Transportistas Unificados (CNTU)
33	Transport	Incorporation of Hydrogen in the Combustion Chambers of the Transport Vehicles	Incorporation of Hydrogen in the Combustion Chambers of the internal combustion engines of vehicles of transport fro fuel saving and emissions's control	Planning	60,000	New Energy Dominicana
34	Solid Wastes	Capture and Flaring of the Biogas of Duquesa Landfill	Capture and burn and later if feasible energy generation from the landfill gases generated in Duquesa	Registered	350,000	Bionersis y La Jun Corporation

Nº	Category	Characteristics	Description	Status	CERs/year	Institution
35	Solid Wastes	Industrial treatment plant of Urban solid wastes	Capacity of daily processing 800 tons pf Solids waste. Biofuturo Industrial Recycling Plant. of RSU.	PIN Approved (No-Objection Letter Issued)	40,000	Consorcio Empresarial Biofuturo
36	Solid Wastes	Elaboration of Compost through Solid Wastes and Wastewater	Use of the Solid and Liquid Wastes from the Extraction Process of Palm Oil	Technical evaluation	10,000	Induspalma Dominicana
37	Animal Waste Water	Biogas recovery from anaerobic water treatment systems	Programmatic project of pig farms	Planning	32,977	COOPCIBAO
38	Afforestation	Reforestation of deforested zones	Reforestation of deforested zones of the country with agroforestry cooperatives and nursery.	Planning	6,000,000	RainTree Corp
39	Afforestation	Reforestation of deforested zones	Reforestation of the Upper Basin of the Blanco River	Planning	401,000	TNC
40	Waste	co- digestion (excreta + cachaza) + treatment by composting	Co-digestion of the livestock excretas and wastewater	Technical-finance evaluation	6,000	Consorcio Azucarero de Empresas Industriales

5 GIS-Based Potential Map of CDM Project Development

5.1 Advantage of Using GIS for CDM Project Promotion

GIS (Geographical Information System) consists of two major components, i.e. geographical information (location, altitude, etc.) of the project activity and information about the activity itself. GIS is a useful tool of information management for the promotion and/or control of a CDM project development.

Specifically (in case of this study), the location information of existing CDM projects can be obtained from the figure (geographical information) below. It currently contains two registered projects (one wind power generation and one CH_4 gas capture from final disposal landfill) and other several projects under preparation stages. More detail project information can be obtained from project information/data table shown as an example in the table on next page.

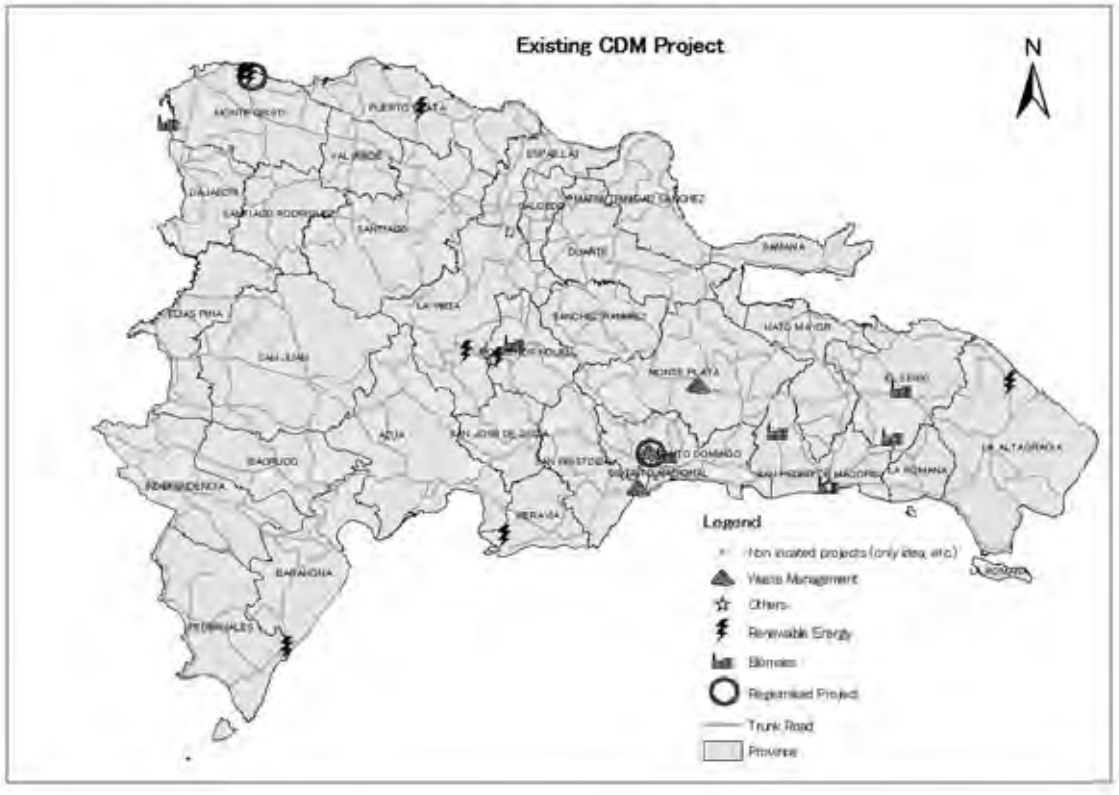

Figure 5-1 : Location Map of the Existing CDM Project

Table 5-1 : Sample of the Attribution Data Table (waste management sector)

No	Categoria_	Categoria1	Caracteris	Descripcio	Situacion	CER anual	Institucio	Municipio	Provincia	XCoordinat	Ycoordinat
2	Gestion de Residuos	Residuos Sólidos	Captura y quema del Biogas del relleno de Duquesa	Captura y quema y de ser factible posterior generación de energia a partir de los Gases de Relleno generados en Duquesa	Registrado	350,000	Bionersis y La Jun Corporation	Santo Domingo Norte	Santo Domingo	397,832	2,052,560
13	Gestion de Residuos	Residuos Sólidos	Planta de tratamiento industrial de residuos solidos Urbanos	Capacidad de procesar dariamente una 800 toneladas de residuos Sólidos. Planta Biofuturo de Reciclaje Inds. de RSU.	PIN Aprobado (carta de No objeció Otorgada)	40,000	Consorcio Empresarial Biofuturo	Santo Domingo Oeste	Santo Domingo	393,935	2,038,199
31	Gestion de Residuos	Residuos Sólidos	Elaboraci□ de Compost a partir de los Residuos Solidos y las Aguas Residuales	Aprovechamiento de los Residuos Sólidos y Líuidos del Proceso de Extracción del Aceite de Palma	Definició Tecnica	10,000	Induspalma Dominicana	Monte Plata	Monte Plata	417,183	2,078,355

The Study prepared the GIS data for the sectors of renewable energy (wind, hydropower, and biomass) and waste management (solid waste and wastewater). The relationship between the maps and GIS data is illustrated in the figure below.

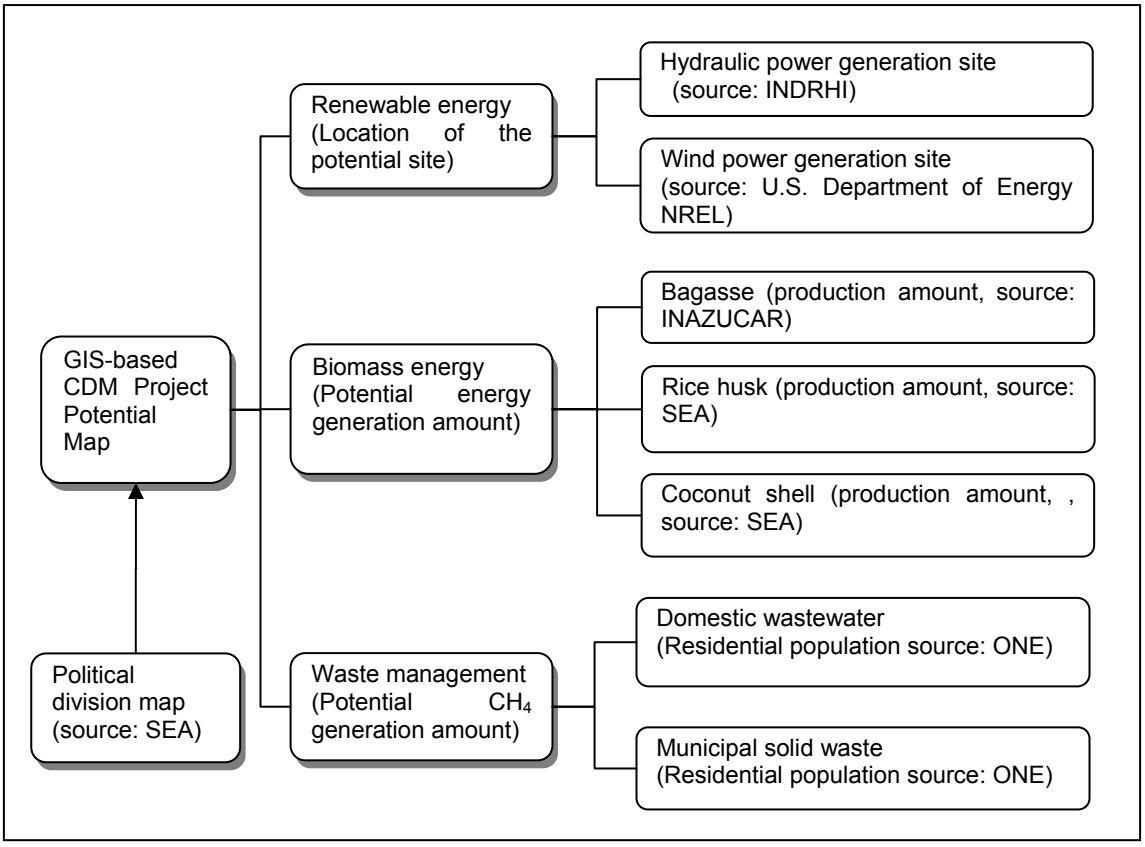

Figure 5-2 : Association Chart of Sector and Data Sources

5.2 Renewable energy sector

5.2.1 Wind power generation

The potential wind power generation performance study has already been conducted by U.S. Department of Energy[1] in 2001. The Study produced a potential map of wind power CDM projects by overlaying the wind power potential data with geographical national grid connection network data.

Assumptions for estimation of the potential wind power capacity installed:		
Minimum wind power	-	300W/m^2
Turbine size	-	500 kW
Hub height	-	40 m
Rotor diameter	-	38 m
5D Side to side spacing	-	190 m
10D Front to back spacing	-	380 m
Swept area	-	1,134 m^2
Capacity/km^2	-	6.9 MW

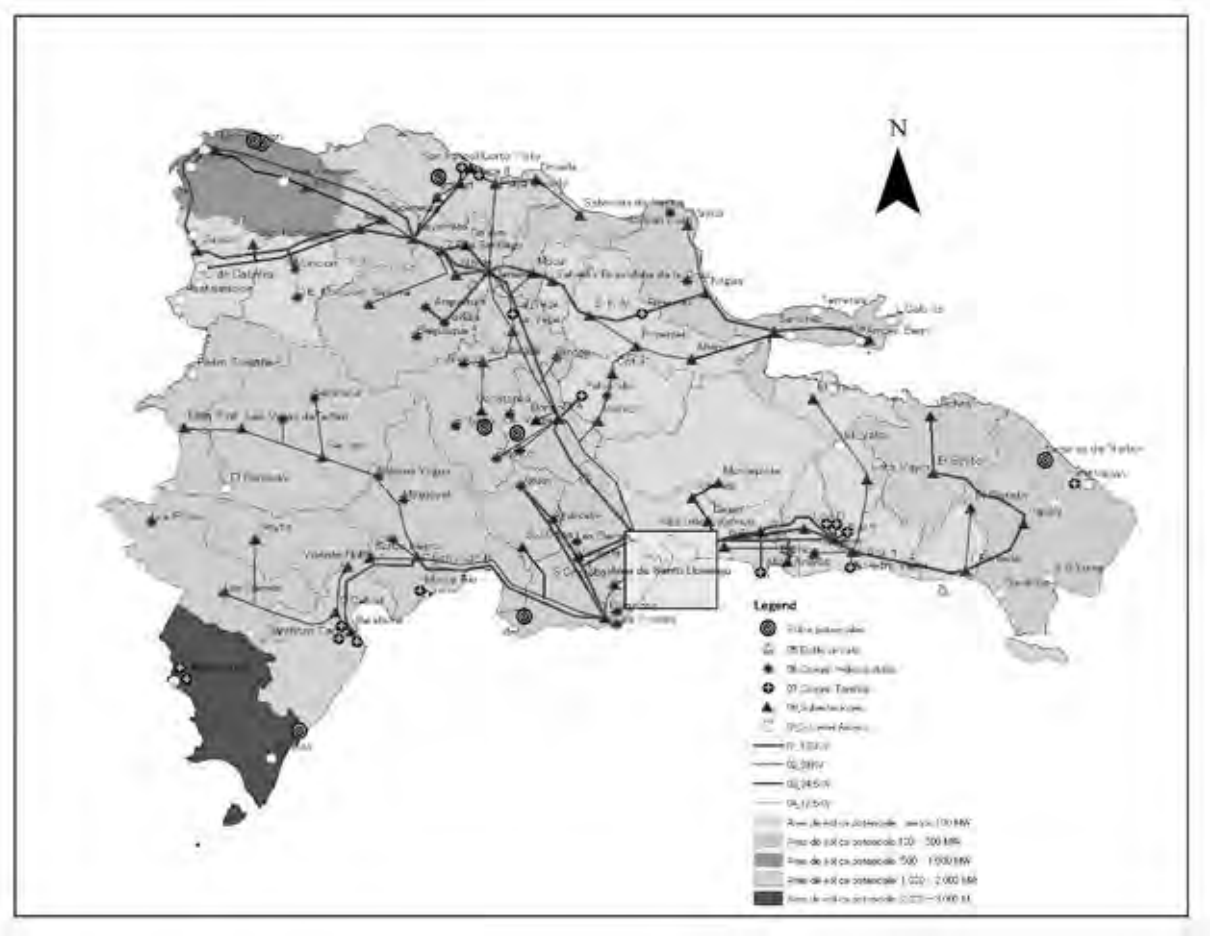

Figure 5-3 : Potential Map for Wind Power Generation Site

[1] Wind Energy Resource Atlas of the Dominican Republic, October 2001,NREL/TP-500-27602, National Renewable Energy Laboratory, U.S. Department of Energy

5.2.2 Hydraulic power generation

The potential hydraulic power generation performance (amount, etc.) is dependent on many factors (a water head, flow rate, water transmission technologies, a water storage amount at a dam site, etc.). However, as the baseline information to investigate potential hydropower development, the Study used the geographical data of INDRHI on potential dam site with estimated water storage capacity. The figure below overlays the INDRHI data with national grid electricity network to identify the potential hydropower areas with grid conncetions.

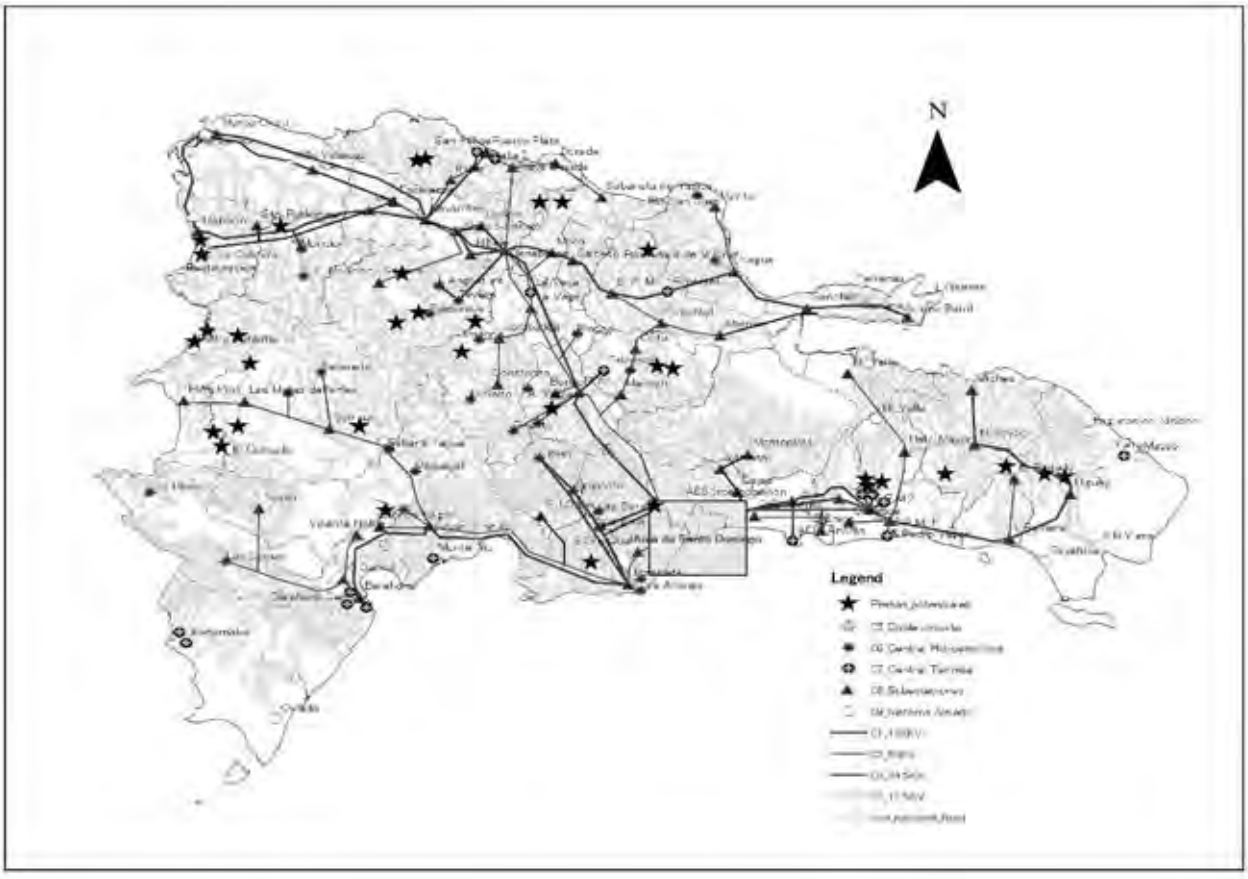

Figure 5-4 : Potential Map for Hydraulic Power Generation Site

5.2.3 Biomass energy

a. Bagasse

Potential energy from the bagasse setting up based on the annual sugarcane production amount and following assumptions;

- Bagasse generation ratio is 33% of sugarcane prodcution,
- Potential calorific value of the bagasse is 8.2 Mj/ton.

Also, sugar refinery plant is located only two provinces in the whole country.

Table 5-2 : Annual Sugarcane and Bagasse Production Amount in 2009

Sugar refinery location (Municipalities)	Plant Area (ha)	Sugarcane Production amount (MT/year)	Estimated Bagasse Generation amount (MT/year)	Potential calorific value of Bagasse (GJ)	Remarks
Central Romana	65,497	3,178,881	1,049,031	8,602,052	ESTE total 10,835,725
Cristal Colon	18,298	825,452	272,399	2,233,673	
Barahona	8,176	616,942	203,591	1,669,445	SUR
TOTAL	91,971	4,621,275	1,525,021	12,505,170	

Souce: Instituto nacional del Azúcar (INAZUCAR)

Note: Residue Production Ration(Residue/Product rations/Mid-range)of Sugarcane is approximately 0.33 of Sugarcane (Source:MEMORIA DEL INSTITUTO AZUCARERO DOMINICANO 1995)
Note: Lower heating value (MJ/kg or GJ/ton) of Bagasse(wet) is 8.2 (Source: Biomass:based on Leach &Gowen 1987;Fossil fuel:IEA 2003a;Natural gas:BP2003)

b. Rice husk

Rice production data was available for the 8 regions below by SEA (Secretaría de Estado de Agricultura).

Table 5-3 : Agriculture Region and Name of Municipalities

Region	Municipality
NORTE	Puerto Plata, Santiago, Espaillata
NORDESTE	Maria Trinidad Sanchez, Duarte, Sanchez Ramirez, Samana
NOROESTE	Monte Cristi, Dajabon, Santiago Rodriguez, Valverde
NORCENTRAL	Salcedo, (Hermanas Mirabal), La vega, Monseñor nouel
CENTRAL	Monte Plata, Santo Domingo, District Nacional, San Cristobal, Peravia, San José De Ocoa
SUR	Bahoruco, Independencia, Barahona, Pedernales
SUROESTE	San juan, Azua, Elias Piña
ESTE	La Altagracia, La Romana, San Pedro De Macoris, El Seibo, Hato Mayor

The energy potential of rice husk was estimated based on the following assumptions;

- rice husk generation ratio is 27% of the rice crop yields,
- potential calorific value of the rice husk is 14.4 Mj/ton of rice husk

Table 5-4 : Annual Rice and Rice Husk Production Amount in 2009

Region	Crop Area (ha)	White rice production amount (MT/yr)	Estimated Rice husk production amount (MT/yr)	Potential calorific value of rice husk (GJ)
NORTE	1,902	5,840	1,577	22,705
NORDESTE	82,708	230,024	62,106	894,333
NOROESTE	49,004	166,543	44,967	647,521
NORCENTRAL	27,951	94,214	25,438	366,302
CENTRAL	3,466	12,554	3,390	48,809
SUR	566	0	0	0
SUROESTE	13,237	33,781	9,121	131,342
ESTE	3,178	8,410	2,271	32,697
TOTAL	182,012	551,365	148,869	2,143,709

Source: SEA, Departamento de Seguimiento, Control y Evaluación
Note: Residue Producation Rations(Residue/product ratios/Mid-range) of Rice husk is 0.27(Source: Koopmans&Koppejan 1998)
Note: Lower heating value (MJ/kg or GJ/tonne) of Rice hulls is 14.4 (Source: Biomass:based on Leach &Gowen 1987;Fossil fuel:IEA 2003a;Natural gas:BP2003)

c. Coconut shell

Coconut production data is also available in 8 regions SEA (Secretaría de Estado de Agricultura). The energy potential of coconut husk was estimated based on the following assumptions;

- Coconut shell generation ratio is 53% of the crop yields,
- Potential calorific value of the coconut shell is 17.9 Mj/ton

Table 5-5 : Annual Coconut and Coconut Shell Production Amount in 2009

Region	Crop Area (ha)	Production: Coconut (MT/yr)	Estimated Coconut shell production amount (MT/yr)	Potential calorific value of coconut shell (GJ)
NORTE	1,140	170	90	1,612
NORDESTE	54,181	2,911	1,543	27,621
NOROESTE	284	57	30	543
NORCENTRAL	842	100	53	947
CENTRAL	6,501	532	282	5,050
SUR	3,185	384	203	3,639
SUROESTE	482	60	32	568
ESTE	22,444	1,220	647	11,575
TOTAL	89,059	5,434	2,880	51,555

Source: SEA, Departamento de Seguimiento, Control y Evaluación

Note: Residue Production Ration(Residue/Product rations/Mid-range) of Coconut Shell is 0.53(Source Koopmans & Koppejan 1998)

Note: Lower heating value (MJ/kg or GJ/ton) of Coconut shells is 17.9 (Source: Biomass: based on Leach & Gowen 1987;Fossil fuel: IEA 2003a;Natural gas:BP2003)

d. Coffee residue

Based on the available coffee production data in 8 regions by SEA (Secretaría de Estado de Agricultura, its total energy potential was estimated with the following assumptions:

- coffee residue generation ratio is 140% of the crop yields,
- potential calorific value of the coffee residue is 14.4 Mj/ton

Table 5-6 : Annual Coffee and Coffee Residue Production Amount in 2008

Region	Crop Area (ha)	Production: Coffee Beans(MT/yr)	Coffee residue production amount (MT/yr)	Potential calorific value of coffee residue(GJ)
NORTE	24,813	11,343	15,880	260,432
NORDESTE	5,289	1,745	2,443	40,065
NOROESTE	8,073	3,199	4,479	73,456
NORCENTRAL	15,178	5,718	8,006	131,298
CENTRAL	31,694	5,411	7,575	124,230
SUR	27,636	5,845	8,182	134,185
SUROESTE	18,869	3,562	4,987	81,787
ESTE	1,790	1,528	2,139	35,080
TOTAL	133,342	38,351	53,691	880,532

Source: Division de Estadisticas e Informacion, Dpto. De Planificacion, CODOCAFE

Note: The residue potential would be 1.4 times the mass of green beans produced (Source: UNDP Biomass Energy For Cement Production Opportunities in Ethiopia 2009)

Note: Lower heating value(MJ/kg) of coffee husk is 16.4 (Source: UNDP Biomass Energy For Cement Production Opportunities in Ethiopia 2009)

e. Potential map of biomass energy

Based on the above calculation, the Study produced the potential map of biomass energy as shown in the figure below.

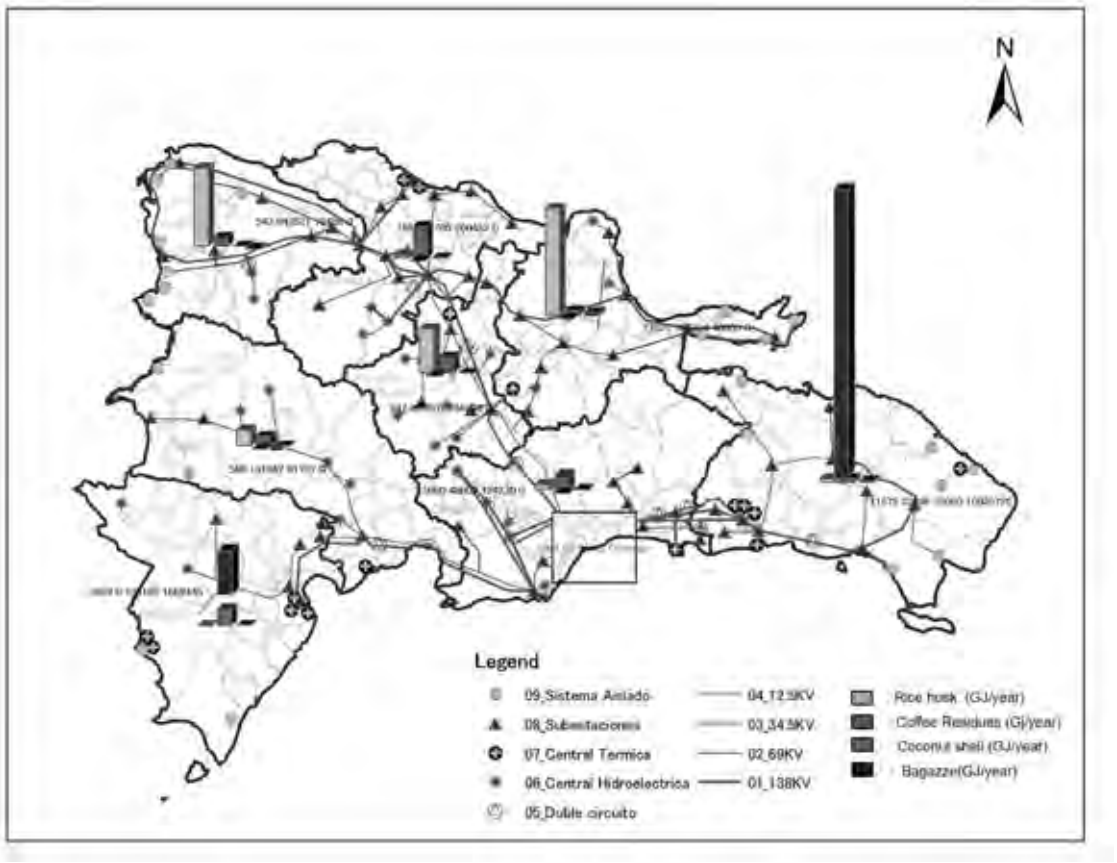

Figure 5-5 : Potential Map for Biomass Energy

5.3 Waste Mamagement

5.3.1 Municipal Solid Waste

The Study estimated the potential CH_4 generation rate (CH_4 kg/person/year) by municipal solid waste generation based on IPCC guideline[2]. The total CH_4 generation amount was calculated as the product of waste generation rate and estimated population data in 2010 by ONE (Oficina Nacional de Estadística).

[2] 2006 IPCC Guideline for National Greenhouse Gas Inventories Volume5, Chapter 2&3

a. IPPC Guidline

The equation used from IPCC guidelines for estimating potential CH_4 emissions from municipal solid waste is as follows:

EQUATION 3.2 (IPCC)
DECOMPOSABLE DOC FROM WASTE DISPOSAL DATA

$$DDOCm = W \bullet DOC \bullet DOC_f \bullet MCF$$

Where:
DDOCm = mass of decomposable DOC deposited, Gg
W = mass of waste deposited, Gg
DOC = degradable organic carbon in the year of deposition, fraction, Gg C/Gg waste
DOC f = fraction of DOC that can decompose (fraction)
MCF = CH_4correction factor for aerobic decomposition in the year of deposition (fraction)

EQUATION 3.3 (IPCC)
TRANSFORMATION FROM DDOCm TO L_0

$$L_0 = DDOCm \bullet F \bullet 16/12$$

Where:
L o = CH_4 generation potential, Gg CH_4
DDOCm = mass of decomposable DOC, Gg
F = fraction of CH_4 in generated landfill gas (volume fraction)
16/12 = molecular weight ratio CH_4/C (ratio)

The annual CH_4 emission potential from municipal solid waste is shown in the table below.

Table 5-7 : Potential CH_4 Generation Ratio (Municipal Solid Waste)

Composition (Caribbean)		Amount (Gg/y/million persons)	DOC (Degradable organic carbon) Contents (%)	DOCf (fraction of DOC dissimilated)	MCF	Decomposable DOC (DDOCm) deposited	Fraction of methane (F) in developed gas	CH4 generation (Gg/y/million persons)
		W	DOC	DOCf		D = W * DOC * DOCf * MCF	F	Q = D * 16/12 * F
Paper/card board	17%	833.00	40%	0.5	1.0	166.6	0.5	111.067
Textiles	5.10%	249.90	24%	0.5	1.0	29.988	0.5	19.992
Food waste	46.90%	2,298.10	15%	0.5	1.0	172.3575	0.5	114.905
Wood	2.40%	117.60	43%	0.5	1.0	25.284	0.5	16.856
Garden/ park		0.00	20%	0.5	1.0	0	0.5	0.000
Nappies/ Diapers		0.00	24%	0.5	1.0	0	0.5	0.000
Sewage sludge		0.00		0.5	1.0	0	0.5	0.000
Rubber/ leather	1.90%	93.10		0.5	1.0	0		
All other, inerts	26.70%	1,308.30		0.5	1.0	0		
Total	100%	4,900.00				394.23		262.820

Waste Generation Rate 0.49 (ton/cap/yr)= 1,342 (g/person/day)

Potential CH_4 Generation Ratio
26,282(g/person/year)
72(g/person/day)
0.02628(ton/person/year)

Table 5-8 : Annual CH_4 Generation Potential Amount (Municipal Solid Waste)

Province	Population(2010) (source : ,Oficina Nacional Estadística)	CH_4 Generation Potential Amount (ton/year)
DISTRITO NACIONAL	1,111,838	29,221
AZUA	242,109	6,363
DAJABON	66,954	1,760
DUARTE	299,188	7,863
ELIAS PINA	72,130	1,896
EL SEIBO	105,994	2,786
ESPAILLAT	237,101	6,231
LA ALTAGRACIA	229,428	6,030
LA ROMANA	246,234	6,472
LA VEGA	429,563	11,290
MARIA TRINIDAD SANCHEZ	141,678	3,724
MONTE CRISTI	120,833	3,176
PERAVIA	202,250	5,316
PUERTO PLATA	327,510	8,608
SALCEDO	103,259	2,714
SAMANA	98,820	2,597
SAN CRISTOBAL	660,009	17,346
SAN JUAN	245,377	6,449
SAN PEDRO DE MACORIS	337,108	8,860
SANCHEZ RAMIREZ	156,238	4,106
SANTIAGO	1,046,182	27,496
SANTIAGO RODRIGUEZ	54,865	1,442
VALVERDE	190,253	5,000
MONSENOR NOUEL	194,505	5,112
MONTE PLATA	210,365	5,529
HATO MAYOR	90,773	2,386
SAN JOSE DE OCOA	69,204	1,819
SANTO DOMINGO	2,198,333	57,777
BAORUCO	114,967	3,022
BARAHONA	200,602	5,272
INDEPENDENCIA	55,223	1,451
PEDERNALES	25,478	670

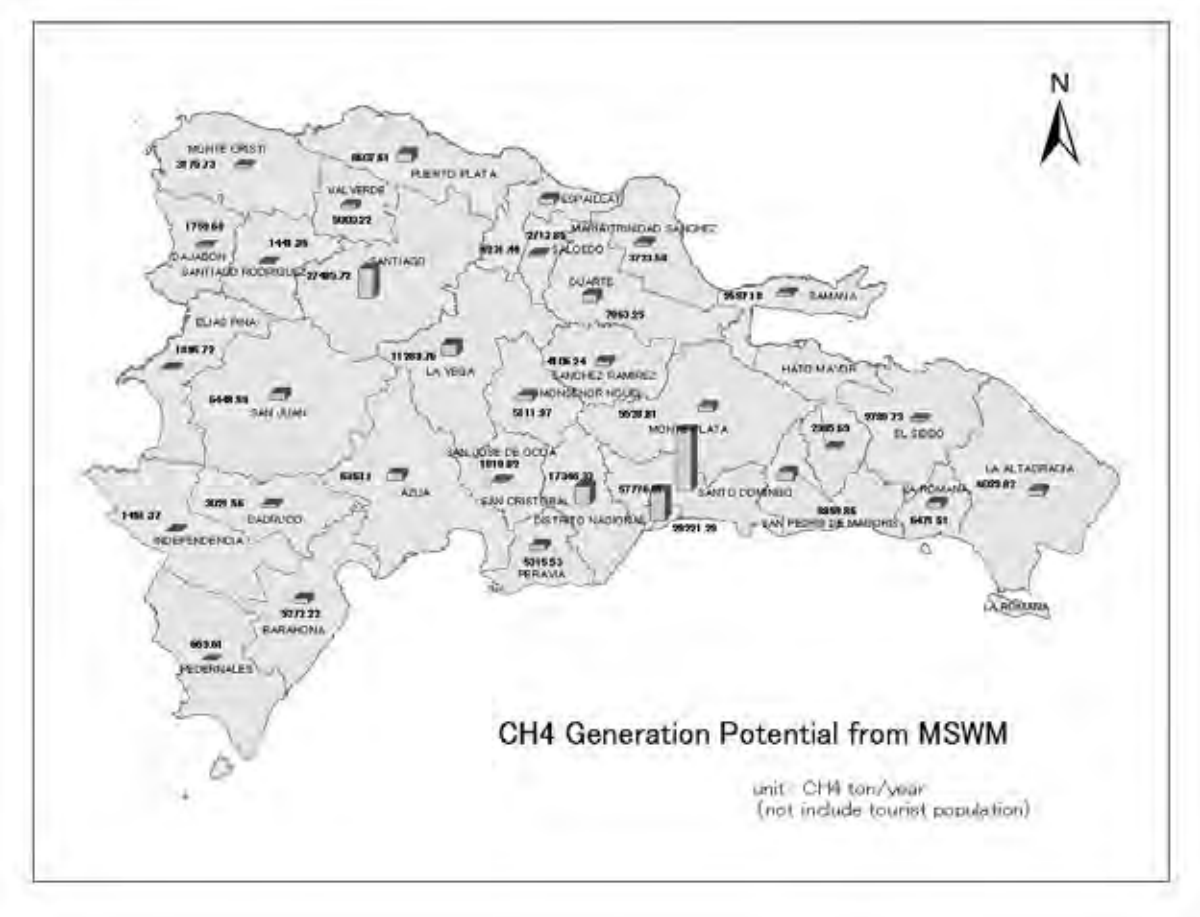

Figure 5-6 : Annual CH_4 Generation Potential Amount (Municipal Solid Waste)

5.3.2 Domestic Wastwater

The study team estimated potential CH_4 generation rate (CH_4 kg/person/year) from domestic wastewater based on IPCC guideline[3]. The total CH_4 generation amount was calculated as the product of domestic wastewater discharge rate and estimated population data in 2010 by ONE (Oficina Nacional de Estadística).

The equation used from IPCC guidelines for estimating potential CH_4 emissions from domestic wastewater is as follows:

EQUATION 6.1(IPCC)
TOTAL CH 4 EMISSIONS FROM DOMESTIC WASTEWATER

$$CH_4 Emissions = [\sum_{i,j}(U_i \cdot T_{i,j} \cdot EF_j)](TOW - S) - R$$

Where:
CH_4 *Emissions* = CH_4 emissions in inventory year, kg CH_4 /yr
TOW = total organics in wastewater in inventory year, kg BOD/yr
S = organic component removed as sludge in inventory year, kg BOD/yr
U_i = fraction of population in income group i in inventory year

[3] 2006 IPCC Guideline for National Greenhouse Gas Inventories Volume5, Chapter 6

$T_{i,j}$ =degree of utilization of treatment/discharge pathway or system, j, for each income group fraction i in inventory year
i = income group: rural, urban high income and urban low income
j = each treatment/discharge pathway or system
EF_j = emission factor, kg CH_4 / kg BOD
R = amount of CH_4 recovered in inventory year, kg CH_4 /yr

EQUATION 6.2(IPCC)
CH_4 EMISSION FACTOR
FOR EACH DOMESTIC WASTEWATER TREATMENT/DISCHARGE PATHWAY OR SYSTEM

$$EF_j = B_0 \cdot MCF_j$$

Where:
EF_j = emission factor, kg CH_4 /kg BOD
j = each treatment/discharge pathway or system
B_o = maximum CH_4 producing capacity, kg CH_4 /kg BOD
MCF_j = methane correction factor (fraction),

TABLE 6.2 (IPCC)
DEFAULT MAXIMUM CH_4 PRODUCING CAPACITY (B_O) FOR DOMESTIC WASTEWATER

0.6 kg CH_4 /kg BOD
0.25 kg CH_4 /kg COD
Based on expert judgment by lead authors and on Doorn et al., (1997)

TABLE 6.3(IPCC) DEFAULT MCF VALUES FOR DOMESTIC WASTEWATER

Type of treatment and discharge pathway or system	Comments	MCF	Range
Untreated system			
Sea, river and lake discharge	Rivers with high organics loadings can turn anaerobic.	0.1	0 – 0.2
Stagnant sewer	Open and warm	0.5	0.4 – 0.8
Flowing sewer (open or closed)	Fast moving, clean. (Insignificant amounts of CH 4 from pump stations, etc)	0	0

EQUATION 6.3 (IPCC)
TOTAL ORGANICALLY DEGRADABLE MATERIAL IN DOMESTIC WASTEWATER

$$TOW = P \cdot BOD \cdot 0.001 \cdot I \cdot 365$$

Where:
TOW = total organics in wastewater in inventory year, kg BOD/yr
P = country population in inventory year, (person)
BOD = country-specific per capita BOD in inventory year, g/person/day
0.001 = conversion from grams BOD to kg BOD
I = correction factor for additional industrial BOD discharged into sewers (for collected the default is 1.25, for uncollected the default is 1.00.)

TABLE 6.4(IPCC) ESTIMATED BOD 5 VALUES IN DOMESTIC WASTEWATER FOR SELECTED REGIONS AND COUNTRIES			
Country/Region	BOD_5 (g/person/day)	Range	Reference
Africa	37	35 – 45	1
Egypt	34	27 – 41	1
Asia, Middle East, Latin America	40	35 – 45	1
Note: These values are based on an assessment of the literature. Please use national values, if available. Reference: 1. Doorn and Liles (1999).			

TOW = P * 40* 0.001*1*365 = 14.6 kg/person/year

EFj = 0.6 * 0.1 = 0.06 kg CH_4/kg BOD

CH_4 *Generation* = 0.06 * 14.6 =0.876 kg/person/year

Annual CH_4 generation potential from domestic wastewater was estimated as shown in the table below.

Table 5-9 : Annual CH_4 Generation Potential Amount (Domestic Wastewater)

Province	Population(2010) (source : ,Oficina Nacional Estadística)	TOW (kg/year)	CH_4 Generation Potential Amount (ton/year)
DISTRITO NACIONAL	1,111,840	16,232,864.0	974.0
AZUA	242,109	3,534,791	212.1
DAJABON	66,954	977,528	58.7
DUARTE	299,188	4,368,145	262.1
ELIAS PINA	72,130	1,053,098	63.2
EL SEIBO	105,994	1,547,512	92.9
ESPAILLAT	237,101	3,461,675	207.7
LA ALTAGRACIA	229,428	3,349,649	201.0
LA ROMANA	246,234	3,595,016	215.7
LA VEGA	429,563	6,271,620	376.3
MARIA TRINIDAD SANCHEZ	141,678	2,068,499	124.1
MONTE CRISTI	120,833	1,764,162	105.8
PERAVIA	202,250	2,952,850	177.2
PUERTO PLATA	327,510	4,781,646	286.9
SALCEDO	103,259	1,507,581	90.5
SAMANA	98,820	1,442,772	86.6
SAN CRISTOBAL	660,009	9,636,131	578.2
SAN JUAN	245,377	3,582,504	215.0
SAN PEDRO DE MACORIS	337,108	4,921,777	295.3
SANCHEZ RAMIREZ	156,238	2,281,075	136.9
SANTIAGO	1,046,180	15,274,228	916.5
SANTIAGO RODRIGUEZ	54,865	801,029	48.1
VALVERDE	190,253	2,777,694	166.7
MONSENOR NOUEL	194,505	2,839,773	170.4
MONTE PLATA	210,365	3,071,329	184.3
HATO MAYOR	90,773	1,325,286	79.5
SAN JOSE DE OCOA	69,204	1,010,378	60.6
SANTO DOMINGO	2,198,330	32,095,618	1,925.7
BAORUCO	114,967	1,678,518	100.7

Province	Population(2010) (source : ,Oficina Nacional Estadística)	TOW (kg/year)	CH_4 Generation Potential Amount (ton/year)
BARAHONA	200,602	2,928,789	175.7
INDEPENDENCIA	55,223	806,256	48.4
PEDERNALES	25,478	371,979	22.3

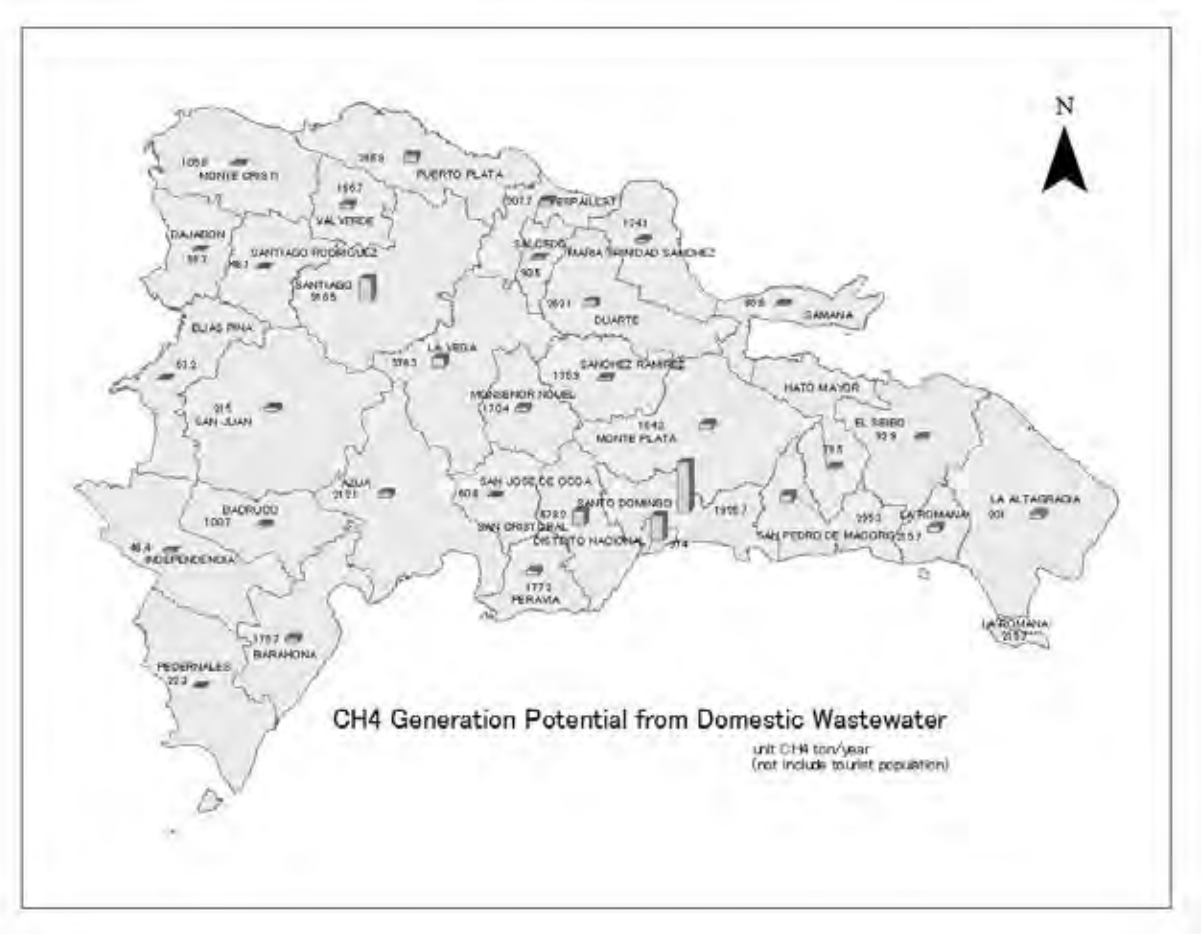

Figure 5-7 : CH_4 Generation Potential Amount form Domestic Wastewater

2. PINs and Model PDDs

Project Idea Notes (PINs)

1. Programmatic CDM project of power generation from renewable synthesis gas (from biomass)
2. Methane capture and its applications in pig farms' self-consumption and in associative activities
3. Composting organic waste
4. Fuel switch in cocoa processing factories

(1) Programmatic CDM project of power generation from renewable synthesis gas (from biomass)

PIN Programmatic Project of electricity generation from renewable synthesis gas from KOAR Dominican Energy.

IDEA NOTE OF PROJECT

October 2008

A. Project description, type, location and schedule

Project name: "Programmatic Project of electricity generation from renewable synthesis gas Energy KOAR Dominican Energy."

Technical summary of the project

Project Goal	The project seeks to electricity generation distributed from renewable resources, through the generation of renewable synthesis gas and its use for electricity production in internal combustion engines of Diesel cycle. The project, which would be developed, as a CDM programmatic project, is unique in the country and establishing a new Electrical generation type: distributed, massive, with renewable local fuel. Dominican Koar Energy, directly or through a business consortium or other figure, would develop a Programmatic project for the installation and operation of an electricity generation park, in generation individual modules, distributed throughout the national territory. The first action of the programmatic project will result in the installation of 10 generation distributed centers of 10 MW (10x10MW = 100MW), connected to EDENORTE's distribution grid. For this first stage of the programmatic project, it will be use as raw material agricultural waste for the synthesis gas generation.
Description and activities proposals.	The project seeks to replace electricity from the power grid nationally, depending mainly on heavy fuel oil and coal, for electricity based on renewable vegetable fuel. The project will require the design and installation of a modular infrastructure, necessary for: • Receive waste biomass in pellets shape. • Producing Syngas. • Generate electricity in internal combustion engines. • Inject electricity with the right quality to the national electricity grid. The electricity generating commercial plants proposals in the programmatic project will be lower power than 15MW, so it would apply to small-scale methodologies within the programmatic project. The electricity will be injected to the grid distribution system, according to agreements to be established with the Dominican Corporation of State Electrical Companies, CDEEE.

	In the first activity of the Programmatic MDL (the activities of the programmatic MDL are named CPA's) they will install 10-generation centers of 10 MW of unitary power of generation. The location of the plants will be defined in document design Project (PDD) of the first CPA Program Project (Program of Activities or PoA).
Technology to be use	The technology to be employed will need from the design and construction of a modular power plant lower than 15MW electrical. This one will be developed by Dominican Koar Energy and will allow the production of fuel gas across the processes carried out in the gasifiers. The gas will be used as fuel in renewable electricity generation. It is necessary to emphasize that the diesel engine generator will consume an estimated of 3-5 % of diesel, as necessary initiator of flame in the internal combustion. This consumption of diesel and its emissions will be assessed to the calculation effects of emissions of the project. The modular plants will consist, for the gas production and electricity of: • Reactors - gasifiers developed by Dominican KOAR Energy. • Internal combustion of Diesel engines cycle, adapted for the synthesis gas use, with electricity generating equipments. • The electrical equipment needed to give the electricity to the voltage substation, intensity, safety and quality needed by the electrical grid. • The equipments needed for the correct supply of the gasifiers with renewable biomass. The project seeks to displace fossil fuel use for the grid, through the production of electricity from renewable way. The greenhouse gas emissions quantification is carried out by a small-scale methodology AMS-ID Version 13 "Grid connected renewable electricity generation and the methodology ACM0002 version 7" Grid electricity generation from renewable energy sources. ".it will be develop the necessary steps for the development of the project as " Programmatic Project", to be the best option for the Registration for the Dominican Koar Energy activities program.

Project developer	
Developer's Name Project	**Dominican KOAR Energy**
Type of Organization	Private Company
other (s) function (s) from the Proponent Entity in the project	Developer and sponsor.
Experience Summary Proponent of the relevant Entity in the project	Dominican KOAR Energy is a company based in the corporation Chemium Corp., Company of the petrochemical sector from the United States of America.. KOAR is an American company which principal work is the primary renewable energy production.

PIN Programmatic Project of electrical generation from gas of Dominican KOAR's renewable Energy synthesis.

Full address	
Person to contact	Ricardo Arrese, Gerente República Dominicana
Telephone/fax	Tel: (+1) 809 224 4117
Email/web page	ricardo.arrese@gmail.com.
Project investors	
(Provide the following Information on each of the Investors)	
Name of the investor	Dominican KOAR Energy
Type of organization	Private
Complete address (include e-mail address, if available)	
Main activities	Koar is a American/multinational company whose main task is the primary renewable energy production.
Summary of Organization financial condition	
Project Type	Electricity generation
Greenhouse gases (GHGs) that reduces the project	N/A
Activities Type	Renewable energy project
Activities area	N/A
Energy production	CO2 emissions Reduction in electricity production.
Energy demand	N/A
Transportation	N/A
Waste management	The only waste that will generate the project, ashes home plant will be returned to the field in organic fertilizer way.
others	N.A
Project Location	
Region	America and the Caribbean
Country	Dominican Republic
City	Several / CDM Program
Brief description of Location (s) of the plant (s) or places where the project will be implemented	N / A. As a programmatic project, the project would take the whole national territory of Dominican Republic as a territorial frame of development. The exact location of generation plants will be determined in each design documents of activities (CPA's) with PoA.
Location map	N/A
Project Programming	
Start date	July 2009
Estimated time required before the project starts to operate.	The project would start operating of staggered form, in agreement to the time of installation and plants start up . The first phase of the project is estimated entering operation for the second semester of 2009, with 10 MW, with the purpose of having operative 100MW for December 2010.
Expected date for the first Delivery of CER's	2011
Project lifetime	10 years

PIN Programmatic project of electricity generation from renewable synthesis gas KOAR Dominican Energy.

Current state or project phase	Planning.
Current status of the adoption of Host country.	In process.
The position with the Host Country regarding the Kyoto Protocol.	Dominican Republic ratified the UNFCCC on June 12 1992 and the Kyoto Protocol on October 7 1998. Today, by presidential decree 601-08, the National Bureau for the Clean Development Mechanism (ONMDL) pursues Designated National Authority. The ONMDL sits by Decree Presidential under the National Council for Climate Change and the Clean Development Mechanism, chaired by the President of the Republic.

B. Expected environmental and social benefits

Estimated greenhouse gas Reduced / CO_2 captured (in metric tons CO_2-equivalent)	The first PCA of PoA seeks to replace 850 GWh power from National Interconnected Electric System, SENI. Estimating an emission factor of 0.7 $TnCO_2$/MWh from SENI first emissions approximation of savings would be 595,000 $TnCO_2$ yearly with the first draft of the CPA. (The grid factor issuance and saving emissions of the project will be calculated in an appropriate way for the DDA and the PoA CPA's).
Base Line scene	The project consists of the substitution of diesel as fuel for electricity production that will connect to the Dominican's electrical grid. As it is, the electrical output of a large applicant amount of energy the substitution of fossil fuel of high emission factor for another cleaner such as the synthesis gas carries an important renewable source of emissions savings greenhouse gases. To carry out the project is necessary to invest time and effort research in order to make this substitution of fuel and technology. In the absence of the project, not all these actions will be pursued After and releases (ton CO_2e) for electricity production would remain the same as at present. The scene of the baseline would be the electricity generation with the current mix of SENI's electricity generation
	The project contributes to sustainable development through different ways. Among them include:
Local benefits	This project would contribute to the generation of local jobs for the handling and transportation of raw materials. In the same way new posts in analysis and quality control of synthesis gas, because its production is local. In addition, there will be electricity that will be injected to the grid near consumption centers, allowing better electric service delivery. In the first activity of the PoA will be installed 100 MW in Edenorte distribution grid, which will have a tremendous benefit.

PIN Programmatic project of electricity generation from renewable synthesis gas KOAR Dominican Energy.

	In the current stabilization of the grid distribution, ENEDNORTE. Locally it will be significantly reduced the emissions due to burning in open skies of agricultural waste, as it establish an alternative activity with economic benefits for the farmer.
Global benefits	The main benefit of the project will consist in improving the air quality by reducing the average of gases emissions of greenhouse gases effect in the electricity production. KOAR collaborates in the sustainable development of Dominican Republic. The displacement of fossil fuels (non-renewable resource) by other fuels from renewable sources contributes a positive effect on the environment to assist in the conservation of natural resources. The handling and final waste disposal from other agro-industrial processes (waste biomass) can be a complicated process and damaging to the environment. Besides the Electricity production is a process that demands great amounts of energy, replacing a fossil fuel for another Local less emission factor favors the reduction of the effect greenhouse and a reduced dependence on fossil fuels. Besides the energy of an agricultural waste offers a clean alternative to the usual handling of such waste. It should be emphasize that the business of generating greater Pollutants in the country is open burning of agricultural waste.
Socio-economic aspects	
What would be the possible direct effects (for example: creating jobs, capital requirements, foreign exchange)?	In the workplace, create new jobs for the project development in the agricultural sector, to biomass waste collection needed, and in the industrial sector in the generation of handheld labor for operation and maintenance of the plant, and the parts production for industrial materials collection and feedstock management. Actually are being established strategic alliances with educational centers and technical training for technicians and engineers to ensure the viability of the project and its capital human.
What are other possible effects (for example training and / or education associated with the introduction of new processes, technologies and products / effects of a project in other industries)?	Will be carried out training courses for workers who carry out the project. To develop the project will be used developed technology at the company, by the same promoters of the project: Dominican KOAR Energy, in the country by introducing a new technology, more respects to the environment.
Environmental Strategy / Development sustainable	Within the national development plan is to create conditions for sustainable development strategy for progress in mitigating emissions of greenhouse gases by Secretary of State of Environment and Natural Resources.

	As it is the country's northern region with a high productivity farms, in which the disposal of agricultural waste, as in the rest of the country, just in the open burning are the same This technology represents a turning point in management Environmental agricultural waste. The Open burning of waste farming is one of the largest sources of pollution emission particles, with the high damaging potential. With KOAR's this project aims to demonstrate the technical feasibility, economically and environmentally appropriate management of waste and Energy recovery from them.

B. Funding

The financial information of the project has not been incorporated into the PIN regarded as the information confidentiality of the project during the current phase. It will be conveniently delivered to the DOE after validation of the project.

Total estimated cost of the project	
Project development	This information is not deemed to be declared confidential.
Construction / installation	This information is not deemed to be declared confidential.
Other/(explain)	N/A
Total	This information is not deemed to be declared confidential.
Financing identified sources already or probable	
City	The project was financed entirely by KOAR.
Long-term debt	N/A
Short-term debt	N/A
Unidentified	N/A
CDM sought contribution	8,330,000 US$/year
CDM advanced contribution.	N/A
Income sources through CER.	
Price of RECs (subject to negotiation)	14 U$ US$/ton CO2e
Amount of the value of the agreements expected future sales and / or concretized	Without agreement /Unilateral development.

(2) Methane capture and its applications in pig farms' self-consumption and in associative activities

PROGRAM OF ACTIVITIES (POA) IDEA NOTE

Name of Project : **Methane capture and its applications in pig farms' self-consumption and in associative activities, coordinated by APORLI**

Date submitted : **June 30, 2008**

A. PROJECT DESCRIPTION, TYPE, LOCATION AND SCHEDULE

OBJECTIVE OF THE PROGRAM OF ACTIVITIES (POA) *Describe in not more than 5 lines*	The POA is aimed at : (1) improving the environmental conditions of several municipalities in the Dominican Republic, through a productive use of the pig manure through its conversion into biogas; (2) reducing the energy costs faced by small pig farmers; (3) reducing GHG emissions of the DR; and (4) contribute to the global initiative on climate change.
POA DESCRIPTION AND PROPOSED ACTIVITIES *About ½ page*	The POA will try to use the manure of a universe of 20,000 mothers and 160,000 growing animals, property of up to 400 small and medium farms, for the production of biogas and posterior application of this in the production of electric energy at the farm level. These farmers are concentrated in and around Licey al Medio, a municipality of Central Cibao region of Dominican Republic. Each farmer normally tries to divide his inventory of animals in two places, as a health prevention measure: mothers farm and growing animals farm. Taking into account the fact that animals are normally split, there are nearly 300 locations in the area of influence of the **Asociacion de Porcicultores de Licey al Medio (APORLI)** [1]. APORLI is open to provide other farmers with the necessary support to undertake the necessary investments for the installation of biogas technologies, bringing the total expected number of activities to nearly 400 locations in the province.. The electric generation will support food milling, water pumping and lighting; and the residues of biodigestion will be composted and applied to crops of farmers (auto consumption) or sold to other farmers in the area.
TECHNOLOGY TO BE EMPLOYED[2] *Describe in not more than 5 lines*	The implementation will be based on a selection of technologies proven in the area (biodigestors, electric energy generators, etc.). Although the design of the activities has not yet being finalized, it is also possible that the final selection may involve the development of small centers for gas processing (filtering, compressing and utilization), associated to productive use applications of electrical energy; issue that will be decided at the feasibility level...
TYPE OF PROJECT	
Greenhouse gases targeted $CO_2/CH_4/N_2O/HFCs/PFCs/SF_6$ *(mention what is applicable)*	**CO_2.** **CH_4.**
Type of activities Abatement/CO_2 sequestration	Abatement.

[1] APORLI: Association of Pig farmers of Licey al Medio. Municipality of Licey al Medio. Santiago. Dominican Republic.

[2] Please note that support can only be provided to projects that employ commercially available technology. It would be useful to provide a few examples of where the proposed technology has been employed.

Field of activities *(mention what is applicable)* *See annex 1 for examples*	Waste management and agriculture
LOCATION OF THE POA	
Country	Dominican Republic
City	Licey al Medio
Brief description of the location of the project *No more than 3-5 lines*	Licey al Medio and Moca are two municipalities of Cibao Central, a region with high population density and high animal production. In fact these small municipalities produce more than 75% of national pig production and more than 80% of national egg production, generating an important environmental impact of this small to medium size farms.
PROGRAM ENTITY	
Name of the PROGRAM ENTITY	**Asociacion de Porcicultores de Licey al Medio (APORLI)**
Role of the PROGARM ENTITY	**a. Project Operator X** b. Owner of the site or project c. Owner of the emission reductions d. Seller of the emission reductions e. Project advisor/consultant f. Project investor g. Other, please specify:
Organizational category	a. Government b. Government agency c. Municipality d. Private company e. Non Governmental Organization f. Other, please specify: **Farmer's association**
Contact person	Felix Ramos, President
Address	
Telephone/Fax	809-580-8040
E-mail and web address, if any	
Main activities *Describe in not more than 5 lines*	Aporli is an association of pig producers, facilitates several layers of support and coordination amongst farmers, as well as provision of credit, technical support for the development of the sector in the target area of influence
Summary of the financials *Summarize the financials (total assets, revenues, profit, etc.) in not more than 5 lines*	Available upon request
Summary of the relevant experience of the Project Participant *Describe in not more than 5 lines*	Aporli has operated several environmental programs through the support of both local and international governmental and bilateral organizations, In the area of management of waste streams, Aporli has promoted the installation of different types of biodigestors in pig farms, gaining an important insight into the application of such technologies in the pig farming sector in the country.
EXPECTED SCHEDULE	
Earliest project start date *Year in which the plant/project activity will be operational*	2009
Estimate of time required before becoming operational after approval of the PIN	Time required for financial commitments: 6 months Time required for legal matters: 3 months Time required for construction: 3 months
Expected first year of CER/ERU/VERs delivery	2010
Project lifetime *Number of years*	28 years (Programmatic initiative)
For CDM projects:	7 years twice renewable.

Expected Crediting Period *7 years twice renewable or 10 years fixed* For JI projects: Period within which ERUs are to be earned *(up to and including 2012)*	
Current status or phase of the project *Identification and pre-selection phase/opportunity study finished/pre-feasibility study finished/feasibility study finished/negotiations phase/contracting phase etc. (mention what is applicable and indicate the documentation)*	Identification and pre-selection phase.
Current status of acceptance of the Host Country *Letter of No Objection/Endorsement is available; Letter of No Objection/Endorsement is under discussion or available; Letter of Approval is under discussion or available* *(mention what is applicable)*	No contact have been established with the ONMDL in the country, although the project identification phase of this POA is being discussed with the local DNA.
The position of the Host Country with regard to the Kyoto Protocol	Has the Host Country ratified/acceded to the Kyoto Protocol? YES, 2001 Has the Host Country established a CDM Designated National Authority / JI Designated Focal Point? YES, 2004

B. METHODOLOGY AND ADDITIONALITY

ESTIMATE OF GREENHOUSE GASES ABATED/ CO_2 SEQUESTERED *In metric tons of CO_2 equivalent, please attach calculations*	Annual (if varies annually, provide schedule): 33,215 tCO_2 equivalent in 2009, 66,400 t CO2equivalent in 2010 and from then on 132,800 t CO2equivalent for subsequent years Up to and including 2012: 365,215 tCO_2-equivalent Up to a period of 10 years: 1,162,015 tCO_2-equivalent Up to a period of 7 years: 763,615 tCO_2-equivalent The following table presents estimations on a per farm basis on the estimated emissions reductions to be achieved

	Actividad piloto Operacion de la granja Madres 100 c/u Cerdos en crecimiento 800 c/u Desecho disponible 120 m^3/dia Produccion de biogas 100 m^3/dia Consumo de biogas 5 m^3/kWh Produccion de electricicad 20 kWh/dia Metano (CH4) evitado Contenido medio de metano en biogas 0,60 Volumen evitado de metano 60,0 m^3/dia Densidac de metano 0,71 kg/m^3 Emision evitada de metano 42,6 kg/dia CO2 evitado Calentamiento de CH_4 en relación al CO_2 21 Equivalencia en CO2 del metano evitado (a) 894,6 kg de CO_2/dia Indice de emision del sistema interconectaco 0,8 kg de CO_2/kWh Equivalencia de CO2 evitado por energia generada (b) 16,8 kg de CO_2/dia **Total de CO2 evitado por el piloto, CPA (a+b)** **911 kg de CO_2/dia** The estimated emissions reductions for each representative CPA is 0.91ton CO2equivalente per day to a total of 332 ton CO2equivalent per year. Estimations for different time horizons are based on the supposition that the technology deployment path will include 100 systems for 2009, 200 for 2010 and then the full 400 systems deployed in 2011 **It is expected that over the life of the POA, a total of 3,552,415 ton CO2equivalent will be avoided.**
BASELINE SCENARIO CDM/JI projects must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least: • Which emissions are being reduced by the proposed CDM/JI project? • What would the future look like without the proposed CDM/JI project? *About ¼ - ½ page*	The baseline for the applications is conforming to treatment of waste streams in oxidation lagoons. It is likely that the current practice will continue to be the preferred systems for treatment in the absence of the proposed POA.
ADDITIONALITY Please explain which additionality arguments apply to the project: (i) there is no regulation or incentive scheme in place covering the project (ii) the project is financially weak or not the least cost option (iii) country risk, new technology for country, other barriers (iv) other	(i) The proposal of environmental norms for the pig farming and processing, introduced by SEMARENA to the sector, do not require the production of biogas from manure management systems.. (ii) The offer of credit is very limited to the agricultural sector in the Dominican Republic. APORLI can access to a credit for CPA replications, introducing the link with CDM as additional justification for the loan. (iii) The common practice for disposal of excreta is open lagoon, being this the cheapest way to dispose of generated material flows in the pig production.. (iv) Pig farming in the DR is facing important challenges emerging from the signing of a free trade agreement (DR-CAFTA), by which tax reductions to imported pig meat will be reduced over time, while at the same time local farmers will be required to be in compliance with additional

	environmental standards; which will in turn required additional investment on the side of the farmer. CDM resources are expected to play an important role in maintaining the local producers competitive in this scenario of risk management for competitiveness.. (v) The small and medium pig growers have received information on biogas, including few demonstrative applications; but no large application and dissemination of the technology is observed in the area.
SECTOR BACKGROUND Please describe the laws, regulations, policies and strategies of the Host Country that are of central relevance to the proposed project, as well as any other major trends in the relevant sector. Please in particular explain if the project is running under a public incentive scheme (e.g. preferential tariffs, grants, Official Development Assistance) or is required by law. If the project is already in operation, please describe if CDM/JI revenues were considered in project planning	**Law 64-00 on Environment and Natural Resources**: Legal framework for SEMARENA,describes the methodology to create and apply norms for management of environmental and natural resources issues. **Law 57-07 on Incentives for Renewable Energies.** This creates incentives to be applied through a procedure (Reglamento) in stage of formulation. **Trends.** Reinforcement of associative activities and increase of efficiency in all activities of pig production, in order to mitigate the effects of DR-CAFTA. The POA and associated activities is not running under a public incentive scheme and is not required by any law. The project is not already in operation.
METHODOLOGY	(i) The POA activities will be using approved small scale methodologies such as AMS I.A, AMS. III.D or AMS III.H.

C. FINANCE

TOTAL CAPITAL COST ESTIMATE (PRE-OPERATIONAL)	
Development costs	0.2 US$ million (Feasibility studies, resource studies, etc.)
Installed costs	9.0 US$ million (Property plant, equipment, etc.)
Land	1.0 US$ million – **if the associative center is implemented**
Other costs (please specify)	0.2 US$ million (Legal, consulting, etc.) – **legal aspects of included farms.**
Total project costs	**10.4 US$ million**
SOURCES OF FINANCE TO BE SOUGHT OR ALREADY IDENTIFIED	
Equity Name of the organizations, status of financing agreements and finance (in US$ million)	
Debt – Long-term Name of the organizations, status of financing agreements and finance (in US$ million)	
Debt – Short term Name of the organizations, status of financing agreements and finance (in US$ million)	
Carbon finance advance payments[3] sought from the World Bank carbon funds.	

[3] Advance payment subject to appropriate guarantees may be considered.

(US$ million and a brief clarification, not more than 5 lines)	
SOURCES OF CARBON FINANCE Name of carbon financiers other than any of the World Bank carbon funds that your are contacting (if any)	
INDICATIVE CER/ERU/VER PRICE PER tCO_2e[4] *Price is subject to negotiation. Please indicate VER or CER preference if known.*[5]	Euro 10
TOTAL EMISSION REDUCTION PURCHASE AGREEMENT (ERPA) VALUE	
A period until 2012 (end of the first commitment period)	3,652,150 €
A period of 10 years	11,620,150 €
A period of 7 years	7,636,150 €
Please provide a financial analysis for the proposed CDM/JI activity, including the forecast financial internal rate of return for the project with and without the Emission Reduction revenues. Provide the financial rate of return at the Emission Reduction price indicated in section "Indicative CER/ERU/VER Price". DO NOT assume any up-front payment from the Carbon Finance Unit at the World Bank in the financial analysis that includes World Bank carbon revenue stream. Provide a spreadsheet to support these calculations. The PIN Financial Analysis Model available at www.carbonfinance.org is recommended. Financial model is currently being developed	

D. EXPECTED ENVIRONMENTAL AND SOCIAL BENEFITS

LOCAL BENEFITS E.g. impacts on local air, water and other pollution.	(i) **Impacts on local air.** The project will drastically reduce the odours of local air; improving the quality of life in the region. Additionally, the pollution result of Diesel combustion for electric energy will be reduced. (ii) **Impacts on water.** The project will improve the flows of water of Cibao Central, which are seriously contaminated as consequence of inappropriate management of decantation's lagoons.
GLOBAL BENEFITS Describe if other global benefits than greenhouse gas emission reductions can be attributed to the project.	Avoidance of methane emissions into the atmosphere

[4] Please also use this figure as the carbon price in the PIN Financial Analysis Model (cell C94).

[5] The World Bank Carbon Finance Unit encourages the seller to make an informed decision based on sufficient understanding of the relative risks and price trade-offs of selling VERs vs. CERs. In VER contracts, buyers assume all carbon-specific risks described above, and payment is made once the ERs are verified by the UN-accredited verifier. In CER/ERU contracts, the seller usually assumes a larger component - if not all – of the carbon risks. In such contracts, payment is typically being made upon delivery of the CER/ERU. For more information about Pricing and Risk, see "Risk and Pricing in CDM/JI Market, and Implications on Bank Pricing Guidelines for Emission Reductions".

SOCIO-ECONOMIC ASPECTS	
What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project? Indicate the communities and the number of people that will benefit from this project. *About ¼ page*	**Social contributions** (i) The implementation of the project will contribute to social peace of the area; the small municipalities of Licey al Medio and its neighbour Moca produce more than 75% of national pig production and more than 80% of national egg production, which have generated high levels of contamination in air and water, reaching violent moments, when some protesters have died. **Economic contributions** (ii) New jobs opportunities associated to the management of different systems (biogas, electric energy for self consumption and possible associative center for filtering, compressing and commercialization). (iii) A stable offer of good compost for organic agriculture, which is an important activity in the north area of the Dominican Republic.
What are the possible direct effects (e.g. employment creation, provision of capital required, foreign exchange effects)? *About ¼ page*	(i) **Employment creation.** It's expected the creation of more than 100 direct employments. These personnel will be required (1) to operate, monitor and give maintenance to the system to be installed in pig farms; and (2) to be evolved in compost production. This labor force will work in specific farms, in engineering companies and in research entities. (ii) **Provision of capital.** The investment is estimated over 9.0 US$ million, to be collected from pig farmers, APORLI, local banks and in advance payment of CERs. This capital will be expended in biogas system, electric generators, electric installations, etc.; it can be regarded as an example of key credit for the necessary reengineering of Dominican agriculture. (iii) **Foreign exchange effects.** It's expected that a reduction of fossil fuels imports for electric energy, with consequent preliminary positive effect in foreign exchange.
What are the possible other effects (e.g. training/education associated with the introduction of new processes, technologies and products and/or the effects of a project on other industries)? *About ¼ page*	(i) **Training/education effects.** All the personnel that work in the pig farms will be trained, because all of them influence the manure characteristic, which define the appropriate yields in the biogas production. The yield of biogas production depends on around 15 indicators (maximum of detergent, micro elements, antibiotics, etc). The PDD will include a strategy to link this programmatic project with different levels of education; from basic education to universities, as corporative responsibility of APORLI; in fact, some universities' student have been developing research in biogas with support of this Association. (ii) **Effects in metal-mechanic and electric engineering services industries.** The metal-mechanic industry and electric engineering companies of Cibao Central will have a new market for 28 years, replicating the CPA model. The metal-mechanic industry grew beside the pig and broilers production, reaching an interesting level of development.
ENVIRONMENTAL STRATEGY/ PRIORITIES OF THE HOST COUNTRY A brief description of the project's consistency with the environmental strategy and priorities of the Host Country *About ¼ page*	**The POA proposed is in line with the environmental strategies and priorities of the country. In terms of** Environmental Strategy of the Dominican Republic, the project aims at reducing the environmental impacts from agricultural waste streams. In terms of environmental priorities, the POA is in line with the current efforts of assisting producers to modify and improve their environmental targets in response to DR- CAFTA.

(3) Composting organic waste

A. Basic Project description

Name of Project and date submitted	Composting Organic Waste in Rafey, submitted in January 2009
Technical Project summary	
Project objective	To reduce the quantity of MSW disposed at the Rafey Landfill and the GHG emissions related, providing a model environmental friendly and economically attractive trough the CDM, which would be replicable in other municipalities in Dominican Republic.
Technical description of the project and the proposed activities	The project is an effort to support the ECOPARQUE RAFEY Project, a complex developed by municipal authorities for treatment of the solid waste of Santiago. This project include a recycling facility in the project site to process all MSW from Santiago City. The project activity consists in the use of the organic fraction of this MSW to produce compost, reducing the total quantity of waste to be landfilled and the GHG emissions related. More than 70 percent of all materials entering to Rafey landfill (in total, more of 850 tons per day today) can be diverted through composting. Because the low quality of the compost produced in this conditions, is not an economically attractive sell it as soil conditioner, therefore its planned disposed all compost produced in the landfill site. The project is strongly endorsed by the municipal authorities, who are highly interested in implement effective solutions to handle and to dispose the waste of Santiago City. It's expected the project will help to transfer know-how for the replication of the model.
Technology to be employed	to be defined
Owner and/or project developer	
Name	Ayuntamiento de Santiago
Organizational category	Municipality
Other function(s) of the project developer in the project	Owner / Operator
Summary of the relevant experience of the project developer	By mandate of Dominican Law 176-07[4], its responsibility of the municipality to collect, handle, and disposal all kind of solid waste produced by the population. Among other measurements, since 2005 the Municipality has taken full control of the Landfill (formerly a dumping site) and the waste collecting system; has looking for the support from Japan International Cooperation Agency (technical assistance, implementation of technological solutions, and capacitating programs for municipality professionals) and Xunta de Andalucía (project concept, social impacts, and partial financing).
Address	to be defined
Contact Person	to be defined
Telephone / fax	to be defined
E-mail /webpage	to be defined
Project Sponsors / financers	
Name	to be defined

[4] Law of Municipalities in Dominican Republic. http://fedomu.org.do/docs/LeyMunicipal176-07.pdf

Organizational category	to be defined
Main activity and summary of the financials	to be defined
Address	to be defined
Contact Person	to be defined
Telephone / fax	to be defined
E-mail /webpage	to be defined

Type of project	
Green House Gas (GHG) targeted	**CH_4 / N_2O**
CDM Sectoral scope	13: Waste handling and disposal
[_] Energy production	[_] Renewable energy, except for biomass projects [_] Biomass [_] Cogeneration [_] Energy efficiency by the replacing of technology/existing equipment [_] Energy efficiency, by reengineering / process optimizing [_] Energy efficiency by fuel switch
[_] Energy demand	[_] Replacement of existing "household equipment" [_] Improvement of energy efficiency of existing production equipment
[_] Transport	[_] Engine efficiency [_] Modal shift [_] Fuel switch
[_] Emissions from the hydrocarbon industry	[_] Optimizing the extraction, transport and processing of oil and natural gas
[_] Waste management	[_] Capture of landfill methane emissions [_] Utilization of waste and wastewater emissions [**X**] Avoidance of methane emissions through composting
[_] Others	
Project location	
Region	The Caribbean
Country	Dominican Republic
Region / Province	Santiago
City	Santiago de los Caballeros
Brief description of location	The project site is located in the Norwest part of Santiago de los Caballeros City (12 km from the urban area). Its geographical UTM coordinates are the following: Y : 315,796.8204 (east) X : 2,153,864.7590 (west)
Expected schedule	
Earliest project start date	January 2011
Estimate of time required before becoming operational after approval of the PIN	0 years, 0 months

Project life span	16 years
Expected first year of Certified Emission Reduction (CER)	2011
Current status or phase of the project	Identifying / Planning
Dominican Republic and Kyoto	Dominican Republic is a non-Annex I country of the UNFCCC and has ratified the Kyoto Protocol in February 2002. In September 2008, the country has designed the Consejo Nacional para el Cambio Climatico y Mecanismo de Desarrollo Limpio (National Council for Climate Change and Clean Development Mechanism) as Designed National Authority.

B. Expected environmental and social benefits

Estimated Greenhouse Gases abated / CO_2 Sequestered (in metric tons of CO_2 equivalent)	Units in metric tonnes of CO2-equivalent per year [tonCO_2e/year] Per year (average) in the 10 Year: 101,643 ton CO_2e/year Accumulated in lifespan: 2,256,579 ton CO_2e/year Accumulated in 7 years: 597,501 ton CO_2e/year Accumulated in 10 years: 1,016,426 ton CO_2e/year Accumulated until year 2012: 89,165 ton CO_2e/year
Baseline scenario (before the project)	*Which emissions is the proposed CDM project displacing?* The CDM project activity will avoid the methane emissions associated with the anaerobic decomposition of the organic fraction of the waste being dumped in the Landfill. *What would the future look like without the proposed project?* Currently, more of 300,000 tons of solid waste (mostly organic) are being dumped per year in Rafey, a semi-controlled landfill without a methane collection system. This leads to methane emission from the anaerobic digestion of the organic waste. Without the aerobic composting proposed by the project activity, is likely that emissions will occur. *Describe the project barriers (finance, market, institutional, legal, and technological). What are the solutions to these problems?* Most of municipalities in Dominican Republic have failed in to develop and to implement self-supported systems to manage their MSW, mainly for the difficulties to establish fees for services offered and the legal responsibility to collect, handle, and dispose them. As results, there are not conditions for neither bring investment to the waste sector, or to promote the creation of public politics for incentive them. Under these conditions, the storing of solid waste on dumps keeps being the cheapest method of their neutralization in comparison with alternative methods of neutralization of waste, such as: capture and utilization of landfill gas, high-tech processing, sorting or burning In the case of Rafey Landfill, is not an economical attractive option to base the financial structure of the project in sell the compost produced, mainly for the logistic required and the absence of a formal market of compost, therefore the CDM would be the just one income for the project activity, versus the investment costs and the operating expenses, which the project itself cannot cover. *Which politics, strategies, laws etc. affects the project activities?* The project activity and it is not mandated neither for national law, nor regulation. The project is a voluntary initiative and it is not part of a public or private politic or strategy.
Specific global and local environmental benefits	*Maximum ½ page in total*
Global benefits	The project will avoid the methane emissions (an average of 101,643 ton CO_2e/year) and it could be an example for other developing countries on a relative low cost project for disposal their organic solid waste.
Local benefits	The waste disposed in Rafey Landfill will be reduced. Emissions like odors, flies, liquid leakage from deposited waste, and the methane hazards will be reduced or eliminated.

Environmental impact study	It is not expected the project have any negative environmental impacts. The Project includes carrying an EIA (¿?).
Which guidelines will be applied?	The project will meet all regulation criteria rules and requirements regarding to environmental impacts, these criteria will be taken into account during the preparation of the EIS. Some guidelines to be applied are: • Dominican Law 64-00 about Environment and Natural Resources • Environmental norm about groundwater and underground discharges • Environmental norm about solid waste non-hazardous • Environmental norm about water quality and discharges control • Environmental norm about air quality and pollution control
Socioeconomic benefits from the project	*Maximum ½ page in total*
Benefits on the national / sub regional level	The project will help the development of Dominican Republic, thus not only with the creation of employment and the local staff that will be trained in new technologies and processes, but the development of a high structure of social and economical support for the near communities. This could be a replicable model for the country for a decentralized, environmentally friendly, sustainable, low risk and cost municipal solid waste management.
Benefits in local level	The communities near to the project site (mainly La Mosca / Santa Lucía, La Piña, and Las Colinas) are being highly included in the social component of the project. It is consist in a participative model to rise the life quality of the communities near to Rafey Landfill which includes: programs of education, technical trainee, basic infrastructure for water supply, sanity, health , and some actions for organization and strengthening of community By recovering non-renewable resources (plastic, glass, paper, metals, etc,) and recycling them and by composting the organic waste. The Santiago de los Caballeros city will benefit from an environmentally friendly and low cost waste management and a longer useful life of the existing landfill, thus avoiding the usual opposition against creation of new landfills.
Social impact study	It is not expected the project have any negative environmental impacts.
Which guidelines will be applied?	The municipal authorities are high interested in to develop the project with the minimal negative impacts (environmental and social) possible. The project activity will meet with all rules and requirements regarding to social impacts and community participation.
Environmental strategy / priorities of the Host country	The increment of the population and the growth of productive activities in the country are causing all municipalities considerate the solid waste management like as their top priority. Currently the Dominican Congress is discussing a Solid Waste Law Project[5].

C. Finance

Total project cost estimate				
Development costs	US$ to be defined			
Construction/installation costs	US$ to be defined			
Other costs	US$ to be defined			
Total project costs	US$ to be defined			
Sources of finance to be sought or already identified				
Equity	US$ US$	organization organization	[%] [%]	committed ☐ / negotiation ☐ committed ☐ / negotiation ☐
Debt – Long term	US$ US$	organization organization	[%] [%]	committed ☐ / negotiation ☐ committed ☐ / negotiation ☐
Debt – Short term	US$ US$	organization organization	[%] [%]	committed ☐ / negotiation ☐ committed ☐ / negotiation ☐
Non identified	None			

[5] Dominican Deputies Chamber: initiative 05874-2006-2019-CD. http://www.camaradediputados.gov.do

CDM contribution (complimentary earnings on the sale of CERs)			
Average reduction a year	44,582 ton CO_2 (up to 2012 including itself) 85,357 ton CO_2 (7 years based period) 101,643 ton CO_2 (10 years based period)		
Indicative price on one "CER"	**€ 6 / ton CO_2**	**€ 9 / ton CO_2**	**€ 12 / ton CO_2**
Sale of CERs until 2012	€ 524,288	€ 786,432	€ 1,048,576
CDM contribution if certified 7 years	€ 3,513,303	€ 5,269,954	€ 7,026,606
CDM contribution if certified 10 years	€ 5,976,584	€ 8,964,876	€ 11,953,168
CERs sold in advance	*Is your financial structure depending on CERs sold in advance?* *Please clarify*		
Basic estimation on profitability			
Internal return rate (FRR)	*If the CDM project are financed, please state the financial return rate with and without the sale of the CERs*		
IRR without CERs	[XXX] %		
IRR with CERs, until 2012	[xxx] %	[xxx] %	[xxx] %
IRR with CERs, 7 years period	[xxx] %	[xxx] %	[xxx] %
IRR with CERs, 10 years period	[xxx] %	[xxx] %	[xxx] %