Consejo Nacional para el Cambio Climático y Mecanismo de Desarrollo Limpio (CNCCMDL)
Oficina Nacional de MDL (ONMDL),
Agencia de Cooperación Internacional del Japón (JICA)

El Estudio para la Promoción de Proyectos MDL en la República Dominicana

Plan de Acción Nacional de la República Dominicana para el Desarrollo de Proyectos MDL

INFORME FINAL
ANEXO I
Herramientas para el desarrollo de proyectos MDL

Diciembre 2010

Agencia de Cooperación Internacional del Japón
EX CORPORATION

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JR
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Lista de informes

Los informes del Estudio están formados por los siguientes tomos.

Resumen (en japonés)

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Este informe es el Anexo I en Español.

En este informe se está usando la siguiente tasa de cambio como la base de cálculo.

U$1.00= JP¥91.10.

CONTENIDOS

1. Resumen de Herramientas para el desarrollo de Proyectos MDL

Resumen de Herramientas para el Desarrollo de Proyectos MDL

1 PIN y PDD Modelo

Con el fin de estimular y facilitar el desarrollo de proyectos MDL en la República Dominicana, el Estudio produjo un número de Notas de Ideas de Proyectos (PINs) y modelos de Documento de Diseño de Proyecto (PDD) para las áreas/sectores potenciales. Esta Sección reseña el proceso de la selección de áreas y sectores, y los prototipos de proyectos MDL en el curso del Estudio. Los PINs originales y los PDDs modelo se presentan en los Anexos de este Informe.

1.1 Identificación de Proyectos Potenciales

Como punto de partida en la identificación de proyectos potenciales MDL, el Equipo de Estudio JICA (EEJ) presentó los sectores potenciales y tipos de proyectos que podrían ser desarrollados como MDL en la República Dominicana sobre la base de los materiales y las informaciones obtenidas antes de comenzar el estudio en el terreno. El cuadro siguiente presenta los sectores potenciales y los tipos de proyectos potenciales analizados por el EEJ.

Table 1-1: Análisis Preliminar de Sectores Potenciales /Tipos de Proyectos MDL

Sector Potencial /Sub-Sector	Status
A. Sector Energía Renovable	
Energía Eólica	♦ El estudio sobre el potencial fue realizado por los Estados Unidos, con un estimado de más de 10 mil MW. ♦ Un proyecto ya ha sido registrado con la Junta Ejecutiva MDL, mientras que otros están aún en la etapa de PINs o planes.
Energía Hidráulica Micro	♦ La Autoridad de Energía Hidráulica Estatal preparó una lista de potenciales micro proyectos de energía hidráulica para la licitación como proyectos MDL.
Otras Energías Renovables	♦ USAID brindó asistencia para el desarrollo de micro renovable por 5 años hasta Septiembre de 2008. Los renovables incluyeron biodigestores, energía eólica, y energía solar. ♦ Estos proyectos nunca han sido considerados como proyectos MDL.
B. Agricultura	
Producción de azúcar	♦ Ahorro de energía en la fábrica de azúcar ♦ Existen planes para proyectos, pero no se realizan esfuerzos para aplicarlos como proyectos MDL.
Bio-combustible (Bio-Etanol) Producción a partir de caña de azúcar	♦ Pueden existir PIN o planes de proyectos.
Captura de metano y utilización de energía en porquerizas (fermentación anaeróbica del estiércol de cerdos)	♦ Existen plantas pilotos de acuerdo a la información.
Producción de bio-diesel con base comunitaria a partir de	♦ No se disponen de detalles.

Jatropha	
C. Manejo de Residuos	
Captura de metano y producción de energía	♦ Existen planes de proyectos MDL.
Reducción de la emisión de metano por medio de la operación semi-aeróbica del relleno sanitario	♦ JICA provee asistencia actualmente. Se encuentra en prueba para el registro del proyecto como MDL.
Reducción de la emisión de metano por medio del compostaje de los residuos orgánicos	♦ No existen planes.
D. Industria	
Reducción de CO_2 en la industria del cemento	♦ PIN está siendo preparado para la industria del cemento.
E. Transporte	
Transporte Público (Metro)	♦ En consideración
Cambio de combustible en vehículos motorizados (de LPG a CNG)	♦ En consideración
Introducción de bio-combustible para automóviles	♦ En consideración
F. Residencial y Comercial (Manejo de la Demanda DSM)	
Introducción de calentador solar de agua (conversión de energía solar a electricidad) en hoteles	♦ En consideración
Ahorro de energía por bombillos	♦ PIN en preparación

Por otra parte, la ONMDL presentó el status del portafolio de proyectos MDL que se encuentran en la etapa de preparación de PIN o PDD.

Cuadro 1-2 : Portafolio de Proyectos MDL en etapa de Preparación de PIN o PDD (Septiembre 2008)

Sector	Proponente de Proyecto	Proyecto
Etanol	Dominican Forbes Energy	Generación con Biomasa y Producción de Etanol
Etanol	Ammadol	Producción de Etanol de Remolacha
Metano	Municipalidad de Santo Domingo Norte	Captura de Metano en el Relleno Sanitario Duquesa
Metano	Cámara de Comercio de San José de Ocoa	Captura de Metano en Relleno Sanitario
Metano	SANUT	Captura de Metano de Estiércol de Porcinos
Energía eólica	EGE Haina	Varios Proyectos de Energía Eólica
Energía hidráulica	Rafael Beriguete	Varios Proyectos de Energía Hidráulica
Cambio de energía	EGE Haina	Proyecto de cambio de energía de Bunker a LNG
Cambio de energía	EGE Haina	Proyecto de cambio de combustible de petróleo a LNG
Bio-combustible	IDDI	Producción de Bio-diesel
Bio-combustible	IDDI	Generación con Biomasa y Producción de Etanol
Bio-combustible	Grupo Induspalma Mercasid Dominicana	Captura de Metano y Generación con Efluentes de Aceite de Palma
Cemento	CEMEX Dominicana	Uso de cenizas en la producción de ladrillo (clinker) en la industria del cemento
Sector Multiple	Grupo Vicini	Proyectos Múltiples incluyendo Viento, Bagazo y

		Ganado

Estos datos e informaciones presentados por el EEJ y la ONMDL se compilan como la lista primaria de proyectos potenciales MDL.

1.2 Selección de Proyectos para Preparación de PIN

a. Proceso de Selección

La selección de proyectos para la preparación de PIN fue efectuada de acuerdo al proceso de selección que se indica a continuación.

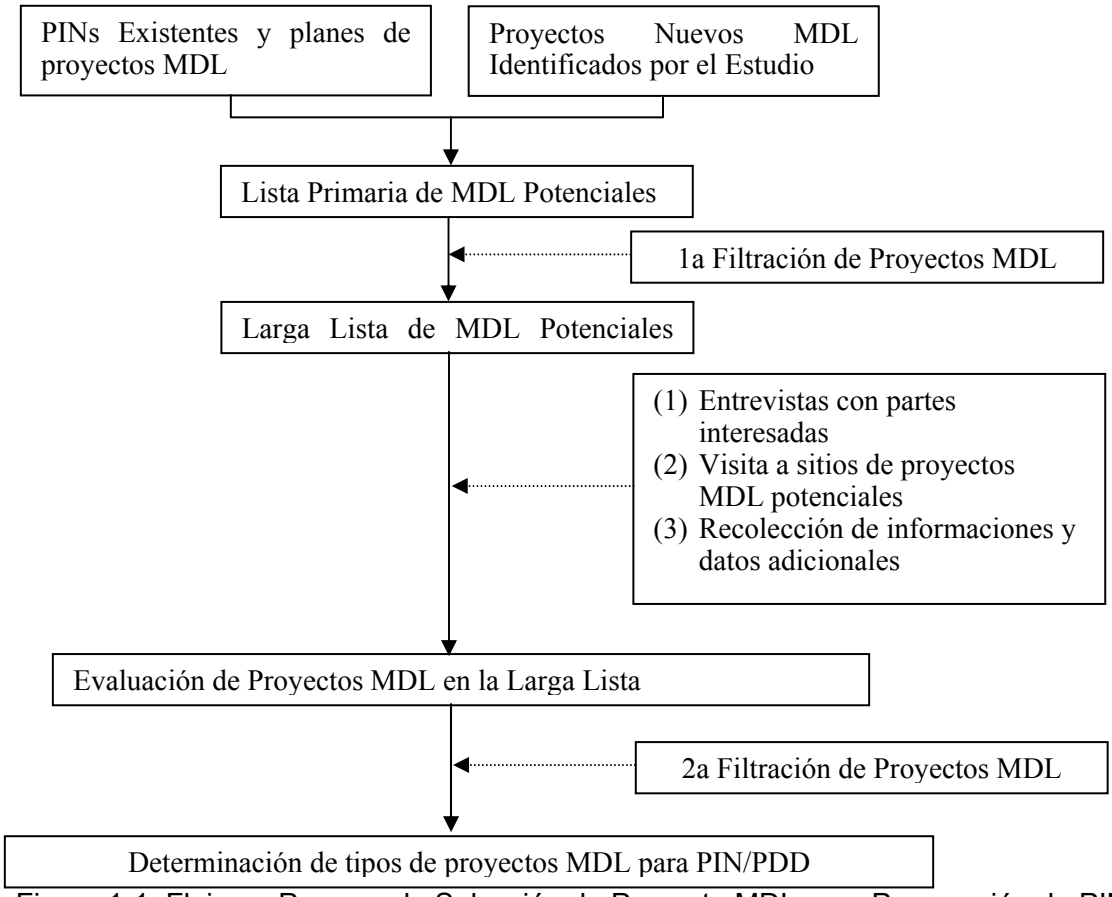


Figura 1-1: Flujo en Proceso de Selección de Proyecto MDL para Preparación de PIN

b. Criterios de Selección

En base a las explicaciones y acuerdos alcanzados durante la presentación del Informe Inicial, se adoptaron los siguientes criterios para la 1a. Filtración y la 2a. Filtración de los proyectos con el fin de determiner los proyectos para la preparación de PIN.

Cuadro 1-3: Criterios de Selección de Proyectos MDL para Preparación de PIN

Filtración	Criterios	Parámetros
1a Filtración	Consistencia con el desarrollo sostenible del país	♦ Efecto de reducción de emisiones de GEIs ♦ Otros beneficios potenciales socioeconómicos y ambientales
	Consistencia con las prioridades de desarrollo nacional	♦ Consistencia con las políticas de desarrollo nacional ♦ Consistencia con las prioridades de desarrollo sectorial
	Eligibilidad de los Proyectos como MDL	♦ Adicionalidad ♦ No-desvío de los fondos de la Asistencia Oficial de Desarrollo
	Grado de definición del Proyecto	♦ Ubicación identificada del proyecto ♦ Determinación del propietario del proyecto ♦ Perfil del proyecto especificado
2a Filtración	Factibilidad del Proyecto	♦ Madurez del proyecto (e.j. estudio preliminarmente detallado ya realizado; plan del proyecto ya preparado, etc.) ♦ La metodología aplicada en el Proyecto ya ha sido preparada, o existe metodología aprobada ♦ Fuerte interés de los propietarios del proyecto en llevarlo a implementación ♦ Existe una estimación precisa del costo y periodo de ejecución del proyecto (construcción y operación) ♦ Ejecución temprana y adquisición de CER ♦ Aplicación de tecnologías comprobadas ♦ Suficientes datos e informaciones para evaluar la factibilidad financiera del proyecto ♦ Suficientes datos e informaciones para estimar la reducción de GEIs resultante del proyecto

Basado en el resultado del primer proceso de filtración, el Estudio preparó algunos PINs para proyectos MDL potenciales que fueron seleccionados, en cooperación con ONMDL y consultores locales contratados por el Estudio. Entre la 1ª y 2ª filtración, el Equipo de Estudio de JICA y la ONMDL realizaron entrevistas con las partes interesadas relevantes, visitas a los sitos de proyectos potenciales, y recopilación de datos e informaciones adicionales con el fin de determinar los proyectos MDL potenciales a ser seleccionados para la preparación de PDDs modelo en base al resultado de la 2ª filtración. Los resultados de las actividades de la 1ª y 2ª filtración se presentan en los cuadros siguientes.

Cuadro 1-4: Resultado de la 1ª Filtración de Proyectos MDL Potenciales

Proyectos MDL Potenciales	Criterios de Filtración o Selección				Resultado
	Compatibilidad con Desarrollo Sostenible	Compatibilidad con Políticas Nacionales de Desarrollo	Eligibilidad como Proyecto MDL	Proyecto Claramente Definido	
Energía Eólica	O	O	O	O	O
Energía Hidráulica	O	O	O	O	O
Energía de Biomasa	O	O	O	O	O
Sustitución de Combustible en Generación Eléctrica	O	O	X	O	X
Captura y Utilización de Metano en Fincas Porcinas	O	O	O	O	O
Producción de Bio-Diesel de *Jatropha curcas*	O	O	O	X	X
Producción de Etanol de la Caña de Azúcar	X	O	X	O	X
Reducción de Emisiones de CO_2 en la Industria de Cemento	O	X	O	O	X
Mejoramiento de la Eficiencia Energética en la Industria Azucarera	O	O	O	O	O
Captura y Utilización de Metano en la Industria del Aceite de Palma	O	O	O	O	O
Producción de Bio-Diesel de Fuentes de Biomasa	X	O	X	O	X
Producción de Etanol de Fuentes de Biomasa	X	O	X	O	X
Captura y Utilización de Metano de Relleno	O	O	O	O	O
Evitar Metano por Tratamiento Semi-Aeróbico de Residuos en el Sitio de Disposición Final	O	O	O	O	O
Evitar Metano por Compostaje de Residuos Orgánicos	O	O	O	O	O
Introducción de Sistema de Transporte Público (Metro)	O	O	O	O	O
Sustitución de Combustible en Vehículos Motorizados	O	O	O	O	O
Introducción de Bio-Diesel para Vehículos Motorizados	O	O	X	X	X
Introducción de Calentadores de Agua Solares en Hoteles y Edificios	O	O	O	O	O
Introducción de Iluminación Eficiente (de incandescente a fluorescente)	O	O	O	O	O

- Se excluyó la sustitución de combustible en generación eléctrica por haber sido incluida ya como parte del plan nacional de desarrollo energético, y será difícil demostrar su adicionalidad.
- Se excluyeron los proyectos de producción de bio-diesel y etanol en consideración de la disputa internacional de que el uso de cultivos alimentarios para combustible puede causar problemas en el abastacimiento estable de alimentos. Aunque *Jatropha curcas* no es un cultivo alimentario, el Estudio no pudo identificar la ubicación de proyectos potenciales para su implementación.
- Se excluyó la industria del cemento debido a que la ceniza del cemento no cumple con las normas de calidad del cemento en la República Dominicana. Sin embargo, en 2010 se modificaron las normas de calidad, y el proyecto está siendo promocionado por la industria de cemento (CEMEX) como un proyecto MDL.

Cuadro 1-5: Resultado de la 2ª Filtración de Proyectos MDL Potenciales

Proyectos MDL Potenciales	Criterios de Filtración o Selección			Resultado	Razones de Exclusión
	Viabilidad	Replicabilidad	Necesidades del Mercado		
Energía Eólica	O	O	O	X	▪ Existe ya un proyecto registrado que puede ser referido en el desarrollo de proyectos MDL similares, por lo cual no es necesario producir PIN y PDD modelo.
Energía Hidráulica	O	O	O	O	
Energía de Biomasa	O	O	O	O	
Captura y Utilización de Metano en Fincas Porcinas	O	O	O	O	
Mejoramiento de la Eficiencia Energética en la Industria Azucarera	O	X	X	X	▪ Debido a la conversión a la producción del etanol y el bio-diesel, no son altas las necesidades del mercado ni la replicabilidad de este proyecto MDL
Captura y Utilización de Metano en la Industria del Aceite de Palma	O	X	X	X	▪ La cantidad de la industria de la palma aceitera es limitada, y estas industrias tienen suficiente capacidad para desarrollar proyectos MDL por sí mismas..
Captura y Utilización de Metano de Relleno	O	O	O	X	▪ Existe un proyecto de captura de metano de relleno en proceso de desarrollar su PDD, por lo cual el Estudio excluyó de la preparación de PDD modelo este tipo de proyecto MDL.
Evitar Metano por Tratamiento Semi-Aeróbico de Residuos en el Sitio de Disposición Final	O	O	O	X	▪ Existe otro proyecto JICA en el proceso de desarrollo de este proyecto como MDL.
Evitar Metano por Compostaje de Residuos Orgánicos	O	O	O	O	
Introducción de Sistema de Transporte Público (Metro)	O	X	X	X	▪ Las organizaciones relevantes se encuentran en el proceso de desarrollar este proyecto MDL, y es baja la replicabilidad de proyectos similares dentro del país.
Sustitución de Combustible en Vehículos Motorizados	X	O	X	X	▪ La madurez del proyecto es baja, y se estima difícil desarrollarlo como proyecto MDL en el tiempo limitado que se dispone.
Introducción de Calentadores de Agua Solares en Hoteles y Edificios	X	O	X	X	▪ La madurez del proyecto es baja, y se estima difícil desarrollarlo como proyecto MDL en el tiempo limitado que se dispone..
Introducción de Iluminación Eficiente (de incandescente a fluorescente)	X	O	X	X	▪ La madurez del proyecto es baja, y se estima difícil desarrollarlo como proyecto MDL en el tiempo limitado que se dispone.

c. Proyectos Potenciales Seleccionados para la Preparación de PDDs Modelo

A través de una serie de proceso de selección mencionado previamente, se escogieron los siguientes sectores y proyectos potenciales para la preparación de PDDs modelo.

- Energía hidráulica
- Generación eléctrica con biomasa
- Captura y utilización de metano en granjas porcinas
- Evitar metano por compostaje de residuos orgánicos

Los PDDs modelo para los proyectos MDL potenciales mencionados arriba se encuentran en los Anexos de este Informe. Los PDDs modelo se han preparado para ser usados por los proponentes potenciales de proyectos MDL, con el fin de mejorar su comprensión del contenido de los PDDs que se requieren para el registro de proyectos MDL. Además, proporciona ejemplos de estimación de reducciones de GEIs para cada tipo de proyecto MDL en base a los supuestos del perfil del proyecto. Tal información puede ayudar en la estimación del potencial de reducción de emisiones de GEIs y el crédito de carbono que se puede esperar de los proyectos que los proponentes planean implementar.

2 Sitio Web de MDL Nacional

A manera de plataforma nacional sobre información MDL en la República Dominicana, el Equipo de Estudio y las contrapartes dominicanas en forma conjunta con el consultor local contratado por el Estudio establecieron el sitio web de MDL a nivel nacional dentro de la página web de CNCCMDL. Este sitio web MDL fue inicialmente lanzado en Febrero de 2009. El contenido del sitio web MDL ha sido actualizado periódicamente, y los resultados obtenidos en el Estudio fueron cargados para la diseminación al público. El sitio web MDL será contínuamente mantenido por el funcionario responsible de ONMDL, CNCCMDL después de la finalización del Estudio. La figura muestra la vista del sitio web MDL (en http://www.cambioclimatico.gob.do/).

Figura 2-1: Vista de la Página del Sitio Web MDL Nacional de la República Dominicana

3 Manual de Formulación de Proyecto MDL

Se ha preparado en el idioma español el Manual de Fromulación de Proyecto MDL para ser usado por los potenciales proponentes de proyectos como un libro guía para el desarrollo de proyectos MDL. En base a las revisiones y discusiones acerca de su contenido, el Manual preparado contiene los elementos indicados en el cuadro siguiente.

Figura 3-1: Contenido del Manual de Formulación de Proyecto MDL

1. Introducción a MDL

1.1 ¿Qué es MDL?

1.2 Conceptos Claves del MDL

1.3 Instituciones del MDL

1.4 Tipología del MDL

1.5 Ciclo de Proyecto MDL

1.6 Costos Relacionados al Ciclo de Proyecto MDL

1.7 Situación Reciente del MDL

2. Documento de Diseño de Proyecto

2.1 Generalidades del PDD

2.2 Contenido del PDD

2.3 Actividades de Proyecto A/R MDL: Aspectos Técnicos

Apéndice

- Lista de formularios necesarios y documentos relacionados
- Metodologías aprobadas
- Herramientas metodológicas
- Herramienta para la demostración y evaluación de la adicionalidad (Ver. 5.2)

Este Manual será periódicamente revisado y actualizado por la ONMDL, el CNCCMDL, con el fin de proporcionar a los potenciales proponentes de proyectos MDL las informaciones técnicas más recientes y los datos sobre documentos de proyectos MDL. El Manual se presenta en los Anexos de este Informe.

4 Portafolio Nacional MDL

El Estudio preparó el portafolio nacional de proyectos MDL en la República Dominicana, en base a las propuestas de proyectos MDL presentadas a la ONMDL en forma de PINs y/o PDDs, con el fin de promocionar los proyectos MDL propuestos entre los potenciales inversionistas, financistas y compradores de CERs, tanto en el mercado nacional como en el internacional. El portafolio está cargado en el sitio web del MDL en la República Dominicana, de tal manera que cualquier interesado, ya sea un individuo o una parte interesada, pueda tener acceso a la información más reciente sobre los detalles de proyectos MDL propuestos en este país.

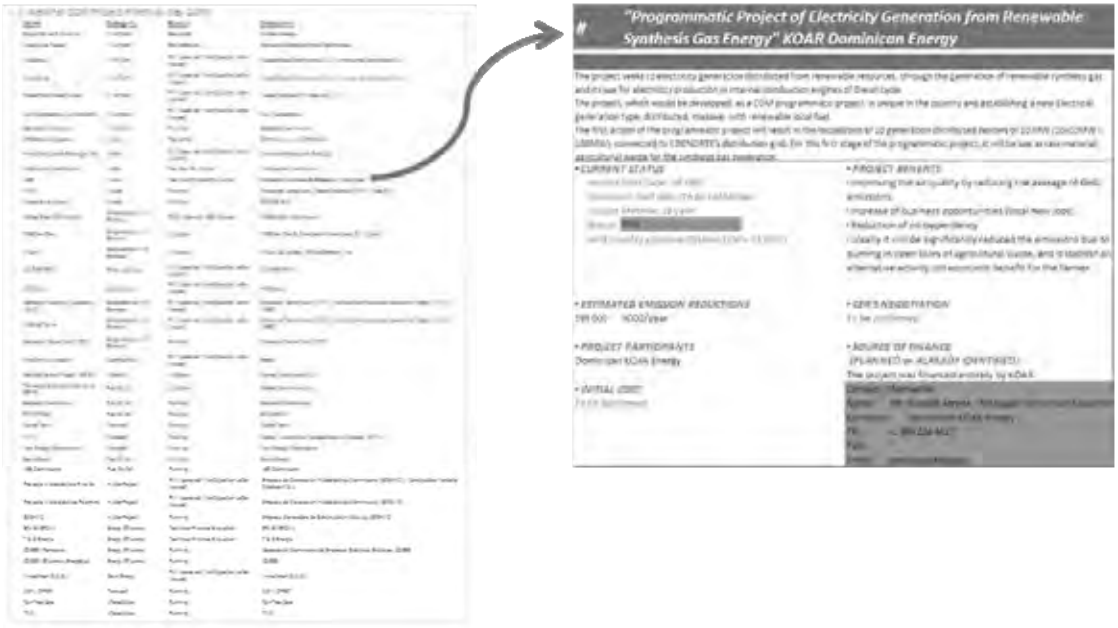
4.1 Estructura Básica del portafolio Nacional MDL

Se presenta en la figura siguiente el portafolio nacional MDL actualmente cargado en el sitio web MDL de la República Dominicana.

Figura 4-3: Vista de la Página del Portafolio Nacional MDL en el Sitio Web MDL

El Portafolio MDL se presenta primero en el sitio web en forma de una lista de proyectos MDL reconocidos por la ONMDL, la DNA de la República Dominicana. Existen actualmente 40 proyectos en la lista del Portafolio.

Además, los detalles de los proyectos y la información sobre la actualización más reciente se encuentran disponibles para cada proyecto MDL del listado de acuerdo al formato indicado en la siguiente figura.



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

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

▸*INITIAL COST*
LKR 69 million (xx USD)

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

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Figura 4-4: Información de Proyectos Disponible en el Portafolio Nacional MDL

4.2 Desarrollo de Proyecto MDL en el Portafolio Actual Nacional MDL

Revisando el portafolio nacional MDL actual, se observa que existen 2 (dos) proyectos registrados en la República Dominicana, a saber, un proyecto de energía eólica, y otro proyecto de captura de metano de relleno. Sin embargo, el primer proyecto registrado sobre energía eólica no ha sido implementado hasta el presente, y está siendo actualmente reintroducido en diferentes localizaciones, mientras que el proyecto de captura de metano de relleno está por comenzar su plena operación. Además, existen 4 (cuatro) proyectos MDL relevantes actualmente en la etapa de validación por las DOEs (Entidades Operacionales Designadas), para luego solicitar sus registros, mientras que los restantes 34 proyectos MDL se encuentran en la etapa de preparación de PDDs o PINs, como se presenta en el siguiente cuadro.

Cuadro 4-8: Status de Desarrollo de Proyecto MDL en la Cartera Nacional MDL

Status de Desarrollo	Número de Proyectos	CERs Estimados (tonsCO_2/año)
Proyectos MDL Registrados	2	465,876
Proyectos MDL en Validación	4	466,504
Proyectos MDL en preparación de PDD (PIN preparado)	13	1,224,898
Proyectos MDL en preparación de PIN	21	8,390,217
Total	40	10,547,495

La mayoría de los proyectos se encuentran aun en las etapas iniciales de desarrollo de proyecto MDL. Si todos los proyectos actualmente en preparación de PDD son registrados e implementados, las CERs estimadas totales serán de aproximadamente 2 millones de toneladas de CO_2 equivalentes.

En referencia a los sectores y áreas, la composición de los proyectos en el portafolio nacional MDL se ilustra en el cuadro siguiente.

Cuadro 4-1: Composición de Proyectos MDL en el portafolio Nacional MDL por Sectores/Areas

Sectores/Areas	**Número de Proyectos**	**CERs Estimadas (toneladas CO_2/año)**
Industrias de la Energía	**23**	**3,179,556**
Fuentes Renovables	20	2,479,556
Fuentes No-Renovables	3	700,000
Relacionados a Energía	**4**	**157,000**
Industria	**2**	**276,725**

Sectores/Areas	Número de Proyectos	CERs Estimadas (toneladas CO_2/año)
Agricultura	**1**	**6,000**
Transporte	**4**	**210,000**
Manejo y Disposición de Residuos	**4**	**432,977**
Aforestación y Reforestación	**2**	**6,401,000**
Total	**40**	**10,547,495**

Aunque los proyectos de aforestación y reforestación estiman un total de CERs de alrededor de 6.54 millones de toneladas de CO_2, se encuentran aun en las etapas iniciales de desarrollo de proyecto MDL sin la preparación de PDD. Es difícil considerar que puedan ser registrados e implementados antes de 2012. La mayoría de los proyectos que maduran con la preparación de PDDs y/o etapa de validación pertenecen a los sectores energía, industria y manejo de residuos. El país debe promocionar proyectos MDL en los sectores y áreas en donde los proyectos puedan ser ejecutados en el corto plazo antes de 2012.

Se presenta en el siguiente cuadro la lista completa de proyectos MDL reconocidos por ONMDL/CNCCMDL.

Cuadro 4-2: Lista Actual de Proyectos MDL en el Portafolio Nacional MDL

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
1	Fuentes Renovables	Parque Eólico 64MW	Construcción, instalación y puesta en marcha de generadores de viento de 850 kW de potencia con rotor de 3 hojas y generador asíncrono de 4 polos, la mejor tecnoloogía para el uso óptimo de los recursos existentes. Parque Eólico El Guanillo.	Registrado	115.879	Gamesa Energy
2	Fuentes Renovables	Cogeneración con residuos de agroforestería	Generación eléctrica utilizando residuos agrícolas (cascarilla de arroz, cáscara de coco y otros). Textile Offshore Site Dominican (TOS-2Rios)	En proceso de validación, en evaluación de PDD	150,000	TOS-Dos Rios & One Carbon International B.V. (Agente)
3	Fuentes Renovables	Parque Eólico 25.2MW	Proyecto eólico de 25.2MW, Los Cocos	Reintroducción	51,000	Consortium Energetic Punta Cana-Macao y EGE-Haina
4	Fuentes Renovables	Generación de vapor a partir de Biomasa	Sustitución de combustible fósil por biomasa en generación de vapor	En proceso de validación, en evaluación de PDD	39,779	Gildan Activewear, Textile Company Inc.

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
5	Fuentes Renovables	Gasificación de residuos de biomasa	Proyecto programático de generación eléctrica con gasificación de biomasa renovable, 100 MW.	PIN aprobado (Carta de No Objeción)	500,000	KOAR ENERGY
6	Fuentes Renovables	Generación hidroeléctrica 80 MWh	Proyecto hidráulico en pequeña escala. Proyecto Hidroeléctrico Palomino.	PIN aprobado (Carta de No Objeción)	72,416	Empresa de Generacion Hidroelectrica Dominicana (EGEHID)
7	Fuentes Renovables	Programa Fotovoltaico	Generación eléctrica con módulos fotovoltaicos. Programa FV RD	PIN aprobado (Carta de No Objeción)	14,000	Investment S.C. S.A
8	Fuentes Renovables	Generación con residuos de biomasa	Generación eléctrica con residuos de biomasa. RJS-Group	PIN aprobado (Carta de No Objeción)	200,000 aprox.	RJS Group, SA.
9	Fuentes Renovables	Cogeneración (instalaciones industriales que consumen vapor y electricidad, con la posibilidad de exportar la energía excedente a la red nacional. 10 MW.	Cogeneración con bagazo de la caña de azúcar e inyección a la red en destilería. Complejo Industrial Quisqueya (CIQ).	PIN aprobado (Carta de No Objeción)	44,449	Consorcio Tecno Deah (CTD)/ Instituto Dominicano de Desarrollo Integral (IDDI), (CBCX)
10	Fuentes Renovables	Cogeneración de energía (vapor y electricidad) del bagazo de la caña de azúcar y otras biomasas resultantes de la operación del Ingenio Comunitario Mata de Palma.	Cogeneración con bagazo de caña de azúcar e inyección a la red. 4.7 MW. Ingenio Comunitario Mata de Palma.	PIN aprobado (Carta de No Objeción)	16,492	Consorcio Tecno Deah (CTD)/ Instituto Dominicano de Desarrollo Integral (IDDI), (CBCX)

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
11	Fuentes Renovables	Generación eólica de 850 KW	Instalación de 40 generadores de viento de 850 KW de potencia (sub-estaciones eléctricas y otros). Parque Eólico Matafongo.	PIN aprobado (Carta de No Objeción)	62,765	Grupo Eólico Dominicano C X A. (Inveravante Dominicana S.A.
12	Fuentes Renovables	Generación eólica de 850 KW	Instalación de 40 generadores de viento de 850 KW de potencia (sub-estaciones eléctricas y otros). Parque Eólico Granadillos.	PIN aprobado (Carta de No Objeción)	65,178	Grupo Eólico Dominicano C X A. (Inveravante Dominicana S.A.
13	Fuentes Renovables	Generación hidroeléctrica de 50 MWh distribuida en dos unidades Pelton de eje vertical de 25 MW	Proyecto hidráulico de pequeña escala. Proyecto Hidroeléctrico Pinalito.	PIN aprobado (Carta de No Objeción)	97,820	Empresa de Generación Hidroelectrica Dominicana (EGEHID)/ Contructora Norberto Odebrecht S.A
14	Fuentes Renovables	Generación con residuos de biomasa	Sustitución de combustible fósil por biogas y biomasa. Destilería La Isabela.	PIN aprobado (Carta de No Objeción)	27,000	Ecosur
15	Fuentes Renovables	Generación eólica de 115 KW	Instalación de 58 turbinas de 2 MW de potencia y 80 m de altitud (sub-estación eléctrica). Parque Eólico Puerto Plata-Imbert.	PIN aprobado (Carta de No Objeción)	65,178	Jasper Caribbean Wind power L.L.C.

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
16	Fuentes Renovables	Generación eólica de 10 KW	Instalación de 10 generadores de viento de 1000 KW cada uno. Parque Eólico La Madrileña.	PIN en evaluación	19,600	MDL Cuba Energía
17	Sustitución de combustible	Sustitución de combustible HFO por gas natural	Sustitución de HFO Nº6 por gas natural. 112 MW	Planeamiento	200,000	Seaboard Dominicana
18	Fuentes Renovables	Parques eólicos	Parques eólicos de 100 MW	Planeamiento	300,000	Seaboard Dominicana
19	Fuentes Renovables	Sustitución de combustible del diesel a biomasa renovable. 1MW.	Sustitución de diesel por biomasa renovable en la planta de procesamiento del cacao	Planeamiento	6,000	BIOCACAO, SA
20	Fuentes No-renovables	Sustitución de combustible del HFO a gas natural	Sustitución de HFO Nº6 a gas natural. 300 MW.	Planeamiento	500,000	Basic Energy
21	Sustitución de combustible	Sustitución de combustible del diesel al gas natural. PoA.	Proyecto programático de sustitución del diesel por gas natural en la generación de calor y electricidad en la industria y el sector hotelero.	Planeamiento		AES Dominicana

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
22	Fuentes Renovables	Parques eólicos	Proyecto eólico de 25.2 MW. Quilvio Cabrera	Reintroducción	16,000	Consortium Energetic Punta Cana-Macao y EGE-Haina
23	Fuentes Renovables	Generación hidroeléctrica de 119 MW	5 proyectos hidroeléctricos de pequeña escala y 2 de gran escala	Planeamiento	616,000	Empresa Generadora de Electricidad Hidráulica, EGEHID
24	Eficiencia energética y energía renovable	Medidas de eficiencia energética y energía renovable	Proyectos de eficiencia energética	Evaluación técnica y financiera	34,000	Energias Renovables Alternativas
25	Eficiencia energética	Sustitución de iluminación T12 y T8 por T5	Sustitución de 150,000 bombillos de baja eficiencia por las de alta eficiencia en edificios públicos	Planeamiento	33,000	Corporación Dominicana de Empresas Eléctricas Estatales, CDEEE
26	Mejoramiento de la eficiencia energética	Eficiencia energética por uso de dispositivos inteligentes o sustitución de aparatos de alto consumo	Medidas de eficiencia energética en hoteles, por medio de la instalación de dispositivos inteligentes en las habitaciones y substitución de unidades de A/C individuales por chillers (sitemas de agua helada)	Evaluación técnica y financiera	40,000	T & S Energia
27	Eficiencia energética	Mejoramiento de la eficiencia en la distribución eléctrica	Compensación de potencia reactiva	Planeamiento	50,000	CDEEE

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
28	Industrial	Incremento de aditivos en la producción de cemento	Uso de aditivos para reducir el porcentaje de clinker en la producción de cemento. Proyecto de mezclado del cemento.	Validación	127,836	Cemex Dominican, S.A.
29	Sustitución de combustible	Sustitución de combustible	Uso de combustibles alternativos y biomasa en los hornos de cemento. CEMEX Dominicana: Proyecto de combustibles alternativos y biomasa en la Planta de Cemento San Pedro	Validación	148,889	Cemex Dominican, S.A.
30	Transporte masivo de pasajeros	Metro de Santo Domingo	Transporte masivo de pasajeros de 1, 2 y 3 líneas en la ciudad de Santo Domingo	Planeamiento	150,000	CAF y OPRET
31	Transporte	Sustitución de combustible en unidades de transporte de pasajeros inter-urbanos	Sustitución de combustible en vehículos a diesel a otro combustible menos intenso en carbono	Planeamiento		Caribe Tours
32	Transporte	Sustitución de combustible en unidades de transporte de pasajeros inter-urbanos	Sustitución de combustible en taxis y buses de transporte urbano. Gasolina/diesel a gas natural	Planeamiento		Central Nacional de Transportistas Unificados (CNTU)
33	Transporte	Incorporación del Hidrógeno en la cámara de combustión de los vehículos de transporte	Incorporación del Hidrógeno en las cámaras de combustión de los motores a combustión interna de los vehículos de transporte, para lograr ahorro de combustible y control de	Planeamiento	60,000	New Energy Dominicana

Nº	Categoría	Características	Descripción	Status	CERs/año	Institución
			emisiones			
34	Residuos sólidos	Captura y quema de biogas en el relleno de Duquesa	Captura y quema, y, si es factible, posteriormente generación de energía a partir del gas generado en Duquesa	Registrado	350,000	Bionersis y La Jun Corporation
35	Residuos sólidos	Planta de tratamiento industrial de los residuos sólidos urbanos	Capacidad de procesamiento de 800 toneladas diarias de residuos sólidos. Planta de Reciclaje Industrial Biofuturo.	PIN aprobado (Carta de No Objeción)	40,000	Consorcio Empresarial Biofuturo
36	Residuos sólidos	Elaboración de compost de residuos sólidos y líquidos	Uso de residuos sólidos y líquidos del proceso de extracción del aceite de palma	Evaluación técnica	10,000	Induspalma Dominicana
37	Aguas residuales de los animales	Recuperación de biogas del sistema de tratamiento anaeróbico de aguas residuales	Proyecto MDL programático de fincas porcinas	Planeamiento	32,977	COOPCIBAO
38	Aforestación	Reforestación de zonas desforestadas	Reforestación de zonas deforestadas del país con cooperativas de agroforestería y viveros	Planeamiento	6,000,000	RainTree Corp
39	Aforestación	Reforestación de zonas deforestadas	Reforestación de la cuenca superior del Río Blanco	Planeamiento	401,000	TNC
40	Residuos	Co-digestión (excreta+ cachaza) + tratamiento por compostaje	Co-digestión de excreta de ganado y aguas residuales	Evaluación técnica y financiera	6,000	Consorcio Azucarero de Empresas Industriales

5 Mapa del Potencial de Desarrollo de Proyecto MDL basado en SIG

5.1 Ventaja de la Utilización del SIG para la Promoción de Proyectos MDL

El SIG (Sistema de Información Geográfica) consiste de dos componentes principales, a saber, la información geográfica (ubicación, altitud, etc.) de la actividad de proyecto, y la información sobre la actividad en sí. El SIG es una herramienta útil para el manejo de la información concerniente a la promoción y/o control del desarrollo de proyectos MDL.

Específicamente, en el caso de este Estudio, la información sobre la ubicación de proyectos MDL existentes puede ser obtenida de la figura que se presenta más abajo (información geográfica). Actualmente contiene dos proyectos registrados (uno sobre generación eólica y otro sobre la captura del gas CH_4 del relleno de disposición final. Existen varios proyectos en la etapa de preparación. Se presentan las informaciones/datos más detallados sobre los proyectos en el cuadro de la siguiente página.

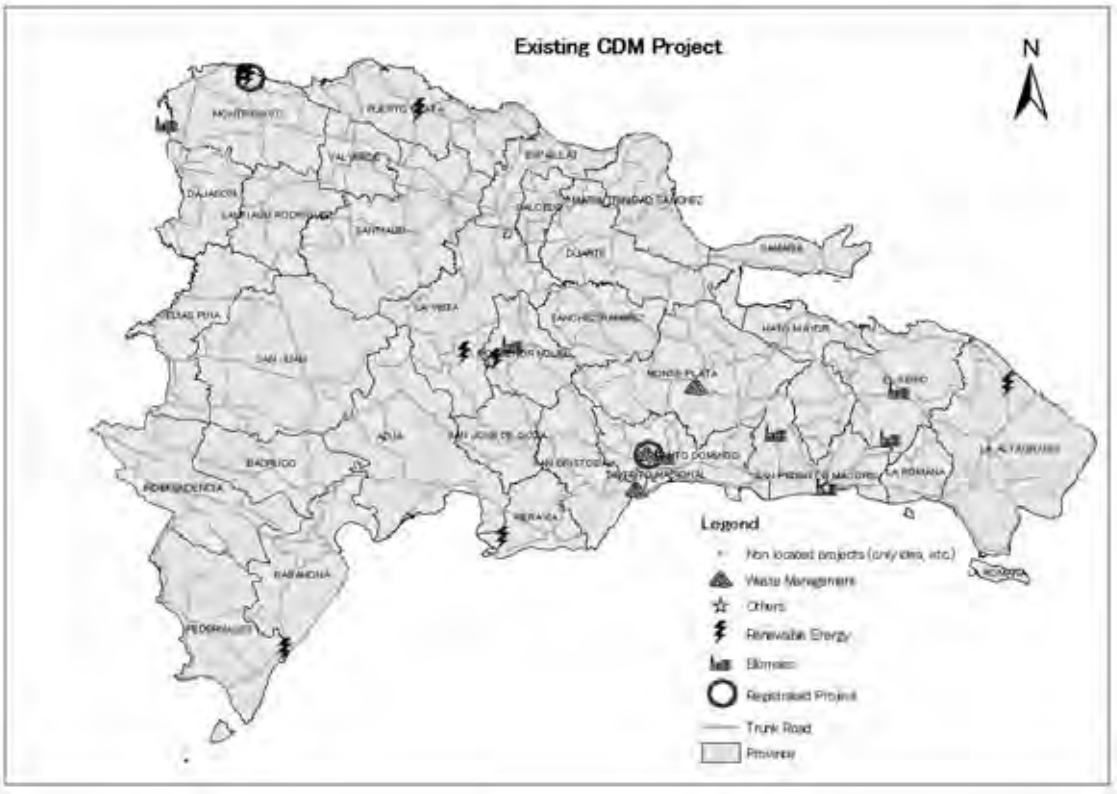


Figura 5-1 : Mapa de Ubicación de los Proyectos MDL Existentes

Cuadro 5-1 : Muestra del Cuadro de Datos de Atribuciones (Sector Manejo de Residuos Sólidos)

No	Categoria_	Categoria1	Caracteristicas	Descripcion	Situacion	CER anual	Institucion	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

El Estudio preparó los datos del SIG para los sectores de energía renovable (eólica, hidroeléctrica, y biomasa), y manejo de residuos (residuos sólidos y aguas residuales). En la figura siguiente se ilustra la relación entre los mapas y los datos del SIG.

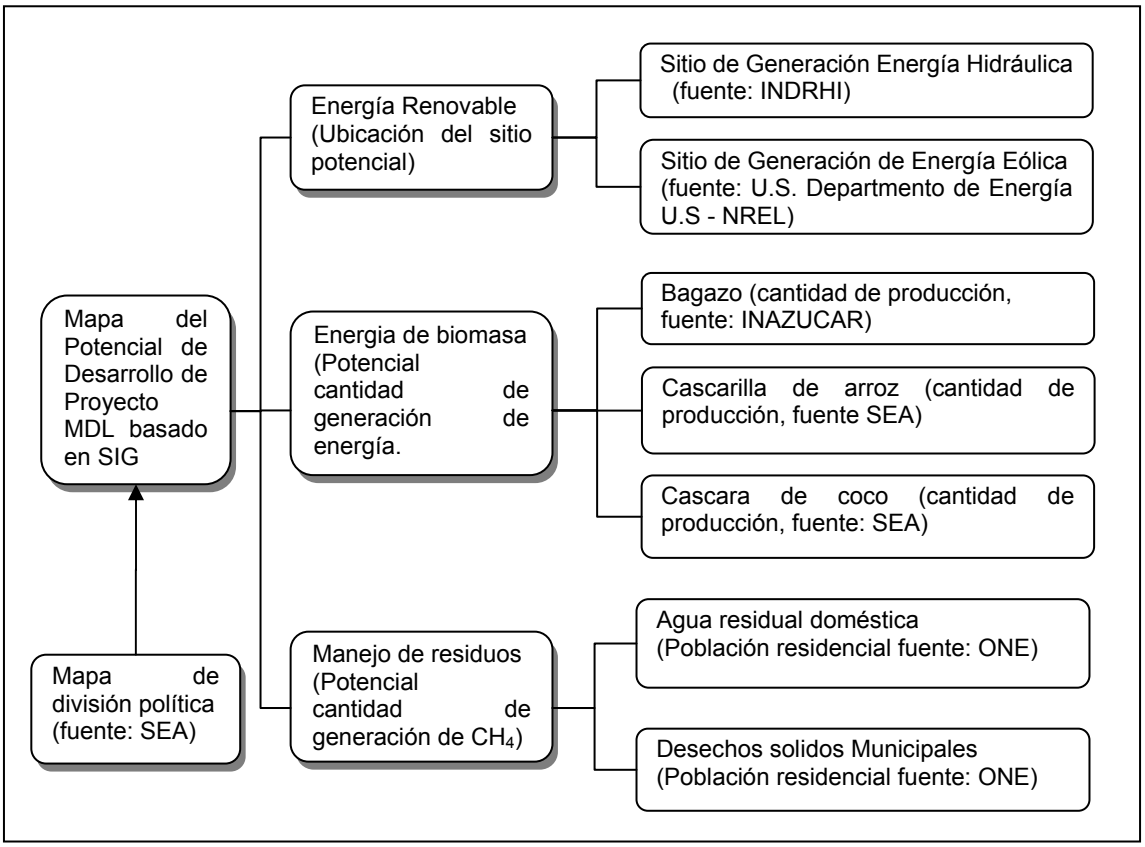


Figura 5-2 : Relación entre Sectores y Fuentes de Datos

5.2 Sector de energía renovable

5.2.1 Generación de energía eólica

El estudio sobre el potencial de generación de la energía eólica ya fue realizado por el Departamento de Energía[1] de los Estados Unidos en 2001. El Estudio preparó un mapa del potencial de proyectos MDL en energía eólica, superponiendo los datos del potencial de la energía eólica a los datos geográficos sobre la red de conexión nacional.

Supuestos para la estimación del potencial de la capacidad instalada de la energía eólica		
Potencia eólica mínima	-	300W/m^2
Tamaño de turbina	-	500 kW
Altura de hub	-	40 m
Diámetro del rotor	-	38 m
Espacio lado a lado 5D	-	190 m
Espacio frontal-posterior 10D	-	380 m
Area de barrido	-	1,134 m^2
Capacidad/km^2	-	6.9 MW

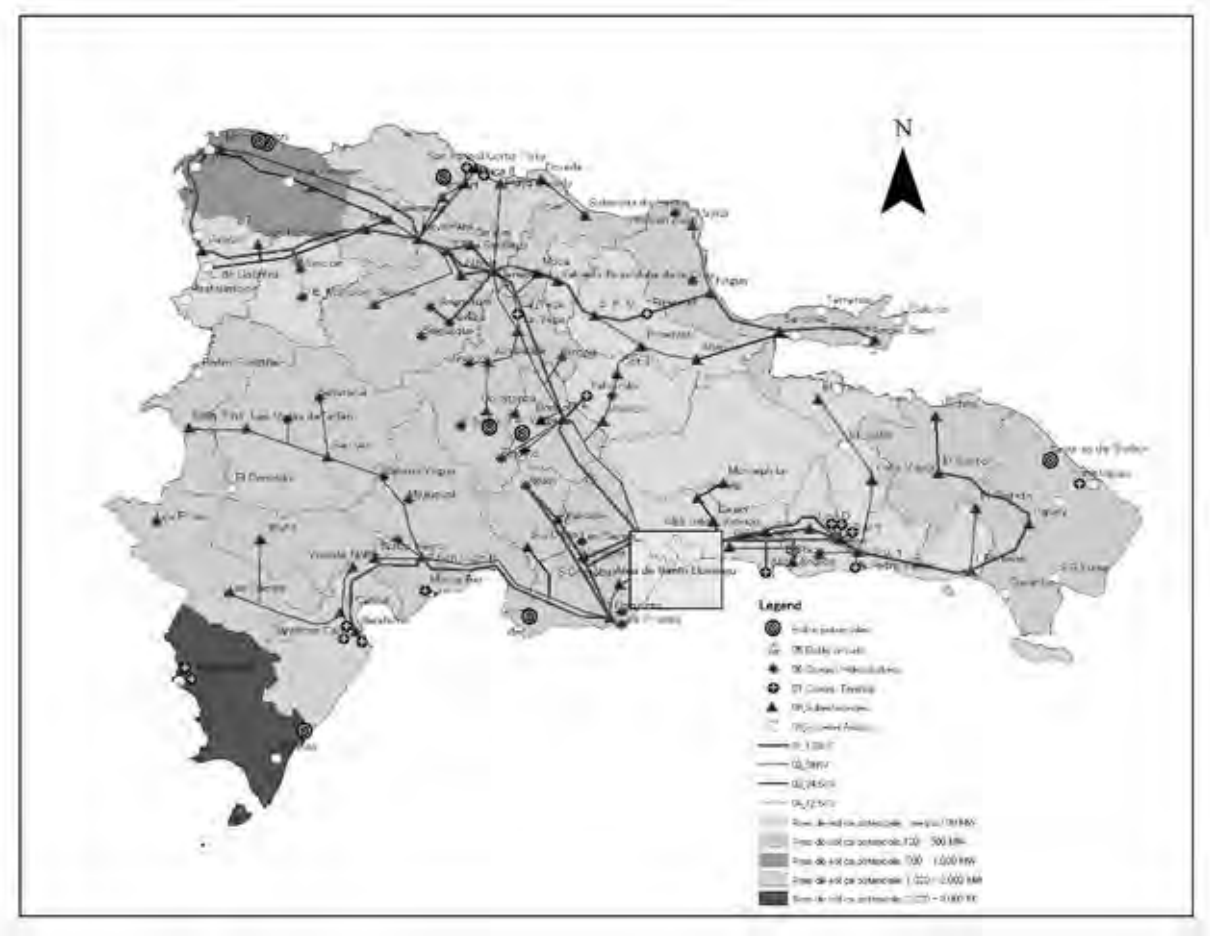


Figura 5-3: Mapa de Sitios Potenciales para Generación de la Energía Eólica

5.2.2 Generación hidroeléctrica

El potencial de generación hidroeléctrica (cantidad, etc.) depende de muchos factores (cabezal de agua, caudal, tecnologías de transmisión de agua, capacidad de almacenamiento de agua en la represa, etc.). Sin embargo, como la información de línea base para investigar el potencial de desarrollo hidroeléctrico, el Estudio utilizó los datos geográficos del INDRHI sobre los sitios potenciales de represas con sus capacidades estimadas de almacenaje de agua. La figura siguiente superpone los datos de INDRHI con la red nacional de electricidad, con el fin de identificar las áreas de desarrollo hidroeléctrico potencial con conexión a la red.

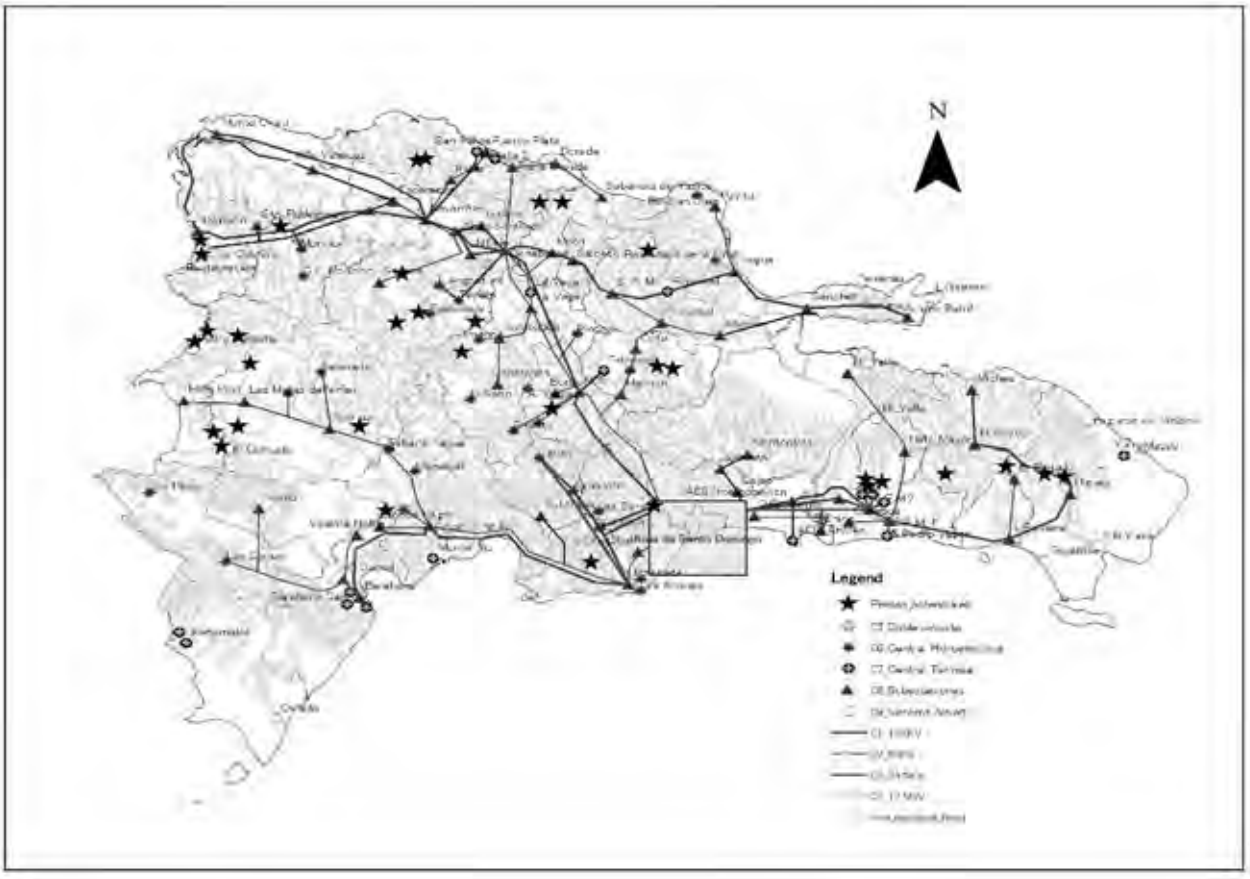


Figura 5-4 : Mapa de Sitios Potenciales de Generación Hidroeléctrica

5.2.3 Energía de biomasa

a. Bagazo

El potencial energético del bagazo se ha estimado en base a la producción anual de la caña de azúcar y los supuestos siguientes:

- La relación de la producción de bagazo es 33% de la producción de la caña de azúcar,
- El valor calorífico potencial del bagazo es de 8.2 Mj/ton.

Se hace notar que los ingenieros azucareros están ubicados en solamente dos provincias del país.

Cuadro 5-2 : Producción Anual de la Caña de Azúcar y Bagazo en 2009

Ubicación del ingenio azucarero	Superficie cultivada (ha)	Producción de la caña de azúcar (TM/año)	Producción estimada de bagazo (TM/año)	Valor calorífico potencial del bagazo (GJ)	Observación
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	

Fuente: Instituto Nacional del Azúcar (INAZUCAR)

Nota: Relación Residuo/Production (Residuo/Producción media) de caña de azúcar es aproximadamente 0.33 (Fuente: MEMORIA DEL INSTITUTO AZUCARERO DOMINICANO 1995)
Nota: Valor calorífico inferior (MJ/kg o GJ/ton) de Bagazo (húmedo) es 8.2 (Fuente: Biomass:based on Leach &Gowen 1987;Fossil fuel:IEA 2003a;Natural gas:BP2003)

b. Cascarilla de arroz

Los datos de producción del arroz se obtuvieron del Ministerio de Agricultura para las 8 Regiones indicadas a continuación.

Cuadro 5-3: Regiones Agrícolas y Municipios

Región	Municipio
NORTE	Puerto Plata, Santiago, Espaillat
NORDESTE	Maria Trinidad Sánchez, Duarte, Sánchez Ramírez, Samaná
NOROESTE	Monte Cristi, Dajabón, Santiago Rodríguez, Valverde
NORCENTRAL	Salcedo, (Hermanas Mirabal), La Vega, Monseñor Nouel
CENTRAL	Monte Plata, Santo Domingo, Distrito Nacional, San Cristóbal, Peravia, San José De Ocoa
SUR	Bahoruco, Independencia, Barahona, Pedernales
SUROESTE	San juan, Azua, Elías Piña
ESTE	La Altagracia, La Romana, San Pedro De Macorís, El Seibo, Hato Mayor

El potencial de energía de las cascarillas de arroz fue estimado en base a los siguientes supuestos:

- Relación de generación de cascarillas es 27% de la producción de arroz,
- El potencial calorífico potencial de la cascarilla de arroz es 14.4 Mj/ton de cascarilla

Cuadro 5-4 : Producción Anual del Arroz y Cascarilla de Arroz en 2009

Región	Supereficie cultivada (ha)	Producción de arroz blanco (TM/año)	Producción estimada de cascarilla de arroz (TM/año)	Valor calorífico potencial de la cascarilla de arroz (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

Fuente: Ministerio de Agricultura, Departamento de Seguimiento, Control y Evaluación
Nota: Relación Residuo/Producción (Residuo/Producción media) de la cascarilla de arroz eis 0.27 (Fuente: Koopmans&Koppejan 1998)
Nota: Valor calorífico inferior (MJ/kg o GJ/tonne) de la cascarilla de arroz es 14.4 (Fuente: Biomass:based on Leach &Gowen 1987;Fossil fuel:IEA 2003a;Natural gas:BP2003)

c. Cáscara de coco

Los datos de producción de coco se obtuvieron también del Ministerio de Agricultura para las 8 Regiones indicadas. El potencial energético de la cáscara de coco fue estimado en base a los supuestos siguientes:

- Relación de generación de la cáscara de coco es 53% de la producción de coco,
- El valor calorífico potencial de la cáscara de coco es 17.9 Mj/ton

Cuadro 5-5 : Producción Anual del Coco y la Cáscara de Coco en 2009

Región	Superficie cultivada (ha)	Producción de coco (TM/año)	Producción estimada de la cáscara de coco (TM/año)	Valor calorífico potencial de la cáscara de coco (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

Fuente: Ministerio de Agricultura, Departamento de Seguimiento, Control y Evaluación
Nota: Relación Residuo/Producción(Residuo/Producción media) de la cáscara de coco es 0.53 (Fuente: Koopmans & Koppejan 1998)

Nota: Valor calorífico inferior (MJ/kg o GJ/ton) de la cáscara de coco es 17.9 (Fuente: Biomass: based on Leach & Gowen 1987;Fossil fuel: IEA 2003a;Natural gas:BP2003)

d. Residuo de café

En base a los datos de producción del café en 8 Regiones suministrados por el Ministerio de Agricultura, el potencial de su energía total fue estimado con los siguientes supuestos:

- Relación de generación de residuos del café es 140% de la producción,
- El valor calorífico potencial de los residuos de café es 14.4 Mj/ton

Cuadro 5-6 : Producción Anual del Café y Residuos de Café en 2008

Región	Superficie cultivada (ha)	Producción de granos de café (TM/año)	Producción de residuos de café (TM/año)	Valor calorífico potencial de los residuos de café (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

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

Nota: Los residuos potenciales constituyen 1.4 veces la masa de granos verdes producidos (Fuente: UNDP Biomass Energy For Cement Production Opportunities in Ethiopia 2009)

Nota: Valor calorífico inferior (MJ/kg) de los residuos de café es 16.4 (Fuente: UNDP Biomass Energy For Cement Production Opportunities in Ethiopia 2009)

e. Mapa del potencial de energía de biomasa

En base a los cálculos indicados arriba, el Estudio preparó el mapa del potencial de energía de biomasa, como se presenta en la figura siguiente.

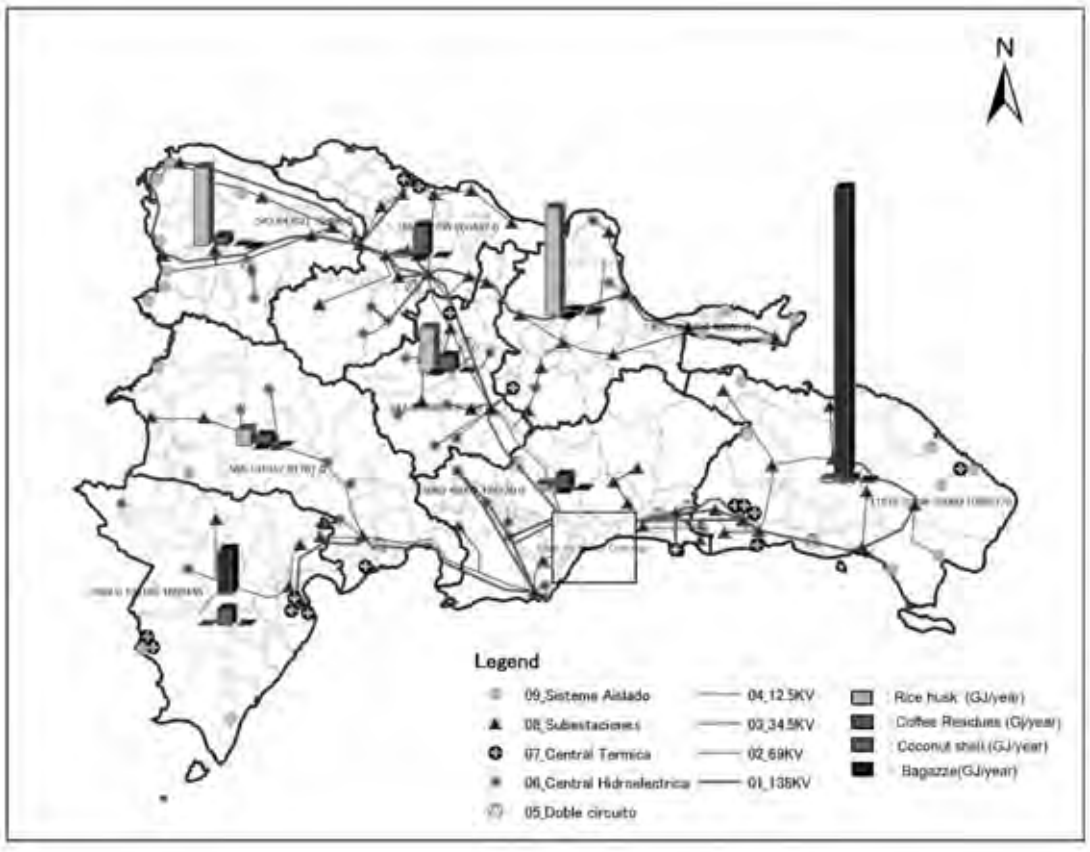


Figura 5-5 : Mapa del Potencial de Energía de Biomasa

5.3 Manejo de Residuos

5.3.1 Residuos Sólidos Municipales

El Equipo de Estudio estimó la tasa potencial de generación de CH_4 (CH_4 kg/persona/año) a partir de los residuos sólidos municipales en base a las directrices[2] del IPCC. La generación total de CH_4 fue calculada como el producto de la tasa de generación de residuos multiplicada por la población 2010 estimada por la ONE (Oficina Nacional de Estadística).

a. Directriz del IPPC

La ecuación utilizada proveniente de la Directriz del IPCC para estimar el potencial de emisiones de CH_4 de los residuos sólidos municipales es la siguiente:

ECUACION 3.2 (IPCC)
DOC DEGRADABLE DE LOS DATOS DE DISPOSICION DE RESIDUOS

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

Donde:
DDOCm = masa de DOC degradable depositado, Gg
W = masa de residuos depositados, Gg
DOC = carbono orgánico degradable en el año de deposición, fracción, Gg C/Gg residuos
DOC f = fracción de DOC que puede descomponerse (fracción)
MCF = factor de corrección de la descomposición aeróbica del CH4 en el año de la deposición (fracción)

ECUACION 3.3 (IPCC)
TRANSFORMACION DE DDOCm A L_0

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

Donde:
L o = generación potencial de CH_4, Gg CH_4
DDOCm = masa de DOC degradable, Gg
F = fracción de CH_4 en gas generado en el relleno (fracción volumétrica)
16/12 = relación de peso molecular CH_4/C (ratio)

Se presenta en el cuadro siguiente las emisiones potenciales de CH_4 de los residuos sólidos municipales.

Cuadro 5-7 : Relación del Potencial de Generación de CH_4 (Residuos Sólidos Municipales)

Composición (Caribe)		Cantidad (Gg/año/millon personas)	Contenido de DOC (Carbono orgánico degradable) (%)	DOCf (fracción de DOC disimilado)	MCF	DOC Degradable (DDOCm) depositado	Fracción de metano (F) en gas desarrollado	Generación de CH4 (Gg/año/millon personas)
		W	DOC	DOCf		D = W * DOC * DOCf * MCF	F	Q = D * 16/12 * F
Papel/cartón	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
Restos aliment.	46.90%	2,298.10	15%	0.5	1.0	172.3575	0.5	114.905
Madera	2.40%	117.60	43%	0.5	1.0	25.284	0.5	16.856
Residuos de jardín/ parques		0.00	20%	0.5	1.0	0	0.5	0.000
Pañales		0.00	24%	0.5	1.0	0	0.5	0.000
Lodo de alcantarillado		0.00		0.5	1.0	0	0.5	0.000
Caucho/ cuero	1.90%	93.10		0.5	1.0	0		
Otros, inertes	26.70%	1,308.30		0.5	1.0	0		
Total	100%	4,900.00				394.23		262.820

Tasa de Generación de Residuos 0.49 (ton/cap/año)= 1,342 (g/person/día)

Tasa Generación Potential CH_4
26,282(g/persona/año)
72(g/persona/día)
0.02628(ton/persona/año)

Cuadro 5-8 : Potencial de Generación Anual de CH_4 (Residuos Sólidos Municipales)

Provincia	Población(2010) (Fuente : Oficina Nacional Estadística)	Potencial de Generación de CH_4 (ton/año)
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
BAHORUCO	114,967	3,022
BARAHONA	200,602	5,272
INDEPENDENCIA	55,223	1,451
PEDERNALES	25,478	670

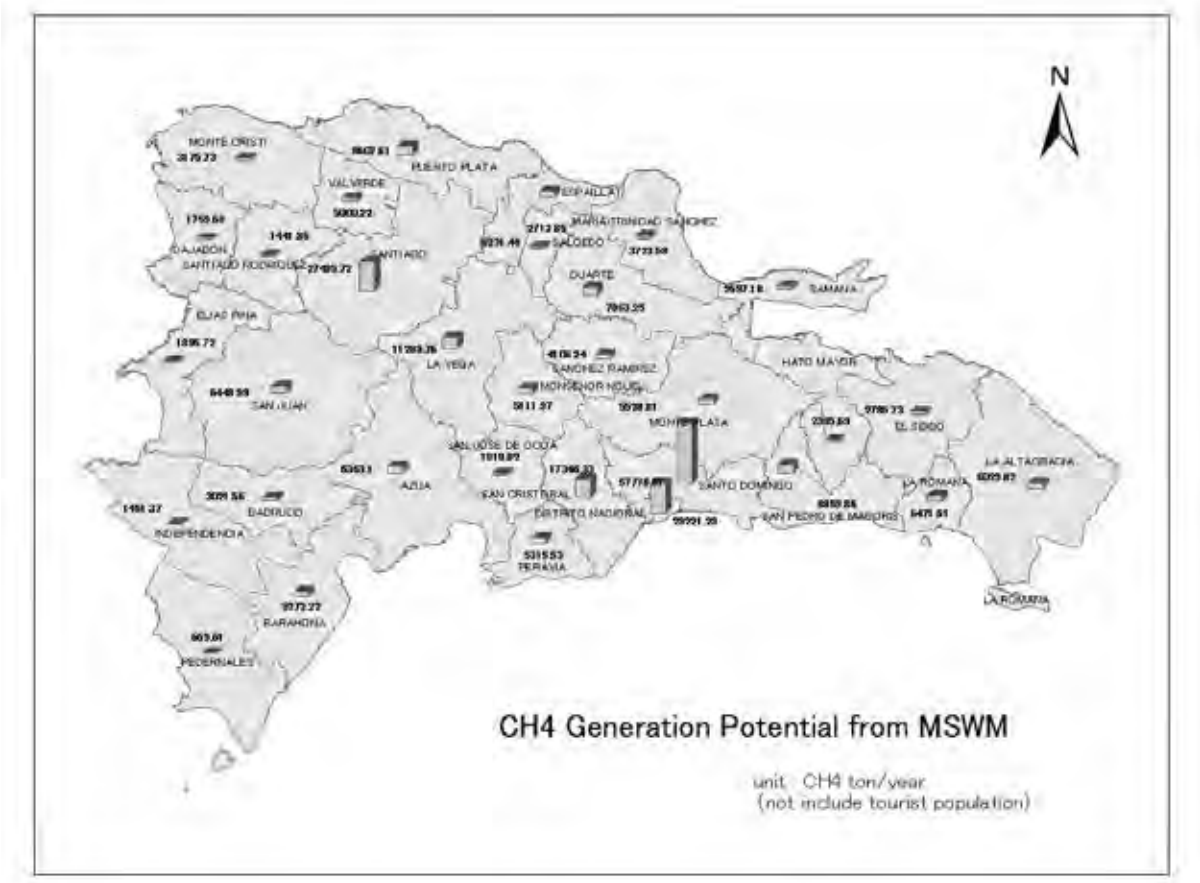


Figura 5-6 : Potencial de Generación Anual de CH_4 (Residuos Sólidos Municipales)

5.3.2 Aguas Residuales Domésticas

El Equipo de Estudio estimó la tasa potencial de generación de CH_4 (CH_4 kg/persona/año) a partir de los residuos sólidos municipales en base a las directrices[3] del IPCC. La generación total de CH_4 fue calculada como el producto de la tasa de generación de residuos multiplicada por la población en el 2010 estimada por la ONE (Oficina Nacional de Estadística).

La ecuación utilizada proveniente de la Directriz del IPCC para estimar el potencial de emisiones de CH_4 de los residuos sólidos municipales es la siguiente:

ECUACION 6.1(IPCC)
TOTAL DE EMISIONES CH4 DE LAS AGUAS RESIDUALES DOMESTICAS

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

Donde:
Emisiones de CH_4 = emisiones de CH_4 en año de inventario, kg CH_4 /año

TOW = orgánicos totales en aguas residuales en año de inventario, kg DBO/año
S = componente orgánico removido como lodo en año de inventario, kg DBO/año
U_i = fracción de la población en grupo de ingreso i en año de inventario

$T_{i,j}$ = grado de utilización del sistema o vía de tratamiento/descarga j, por cada grupo de ingreso fracción i en año de inventario
i = grupo de ingreso: rural, urbano de ingreso alto y urbano de ingreso bajo
j = cada sistema o vía de tratamiento/descarga
EF_j = factor de emisión, kg CH_4 / kg DBO
R = cantidad de CH_4 recuperado en año de inventario, kg CH_4 /año

ECUACION 6.2(IPCC)
FACTOR DE EMISION DE CH_4
PARA CADA SISTEMA O VIA DE TRATAMIENTO/DESCARGA DE AGUAS RESIDUALES DOMESTICAS

$$EF_j = B_0 \cdot MCF_j$$

Donde:
EF_j = factor de emisión, kg CH_4 /kg DBO
j = cada sistema o vía de tratamiento/descarga
B_o = máxima capacidad de producir CH_4, kg CH_4 /kg DBO
MCF_j = factor de corrección de metano (fracción),

CUADRO 6.2 (IPCC)
VALOR PREDETERMINADO DE MAXIMA CAPACIDAD DE PRODUCIR CH_4 (B_O) PARA AGUAS RESIDUALES DOMESTICAS

0.6 kg CH_4 /kg DBO
0.25 kg CH_4 /kg DQO
Basado en el criterio de los autores principales y Doom et al., (1997)

CUADRO 6.3 (IPCC) VALORES PREDETERMINADOS DE MCF PARA AGUAS DOMESTICAS RESIDUALES

Tipo de tratamiento y sistema o vía de descarga	Comentarios	MCF	Rango
Sistema sin tratamiento			
Descarga de mar, río y lago	Ríos con alta carga de orgánicos pueden volverse anaeróbicos	0.1	0 – 0.2
Aguas residuales estancadas	Abierto y cálido	0.5	0.4 – 0.8
Aguas residuales en movimiento de flujo (abierto o cerrado)	Movimiento rápido, limpio (cantidades insignificantes de CH4 de las estaciones de bombeo, etc.)	0	0

ECUACION 6.3 (IPCC)
TOTAL DE MATERIAS ORGANICAS DEGRADABLES EN AGUAS RESIDUALES DOMESTICAS

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

Donde:
TOW = orgánicos totales en aguas residuales en año de inventario, kg DBO/año
P = población del país en año de inventario, (personas)
DBO = DBO per capita específico del país en año de inventario, g/persona/día
0.001 = conversión de gramos de DBO a kg de DBO
I = factor de corrección para descarga adicional industrial de DBO al alcantarillado (para colectado el valor es 1.25, para no-colectado el valor es 1.00.)

CUADRO 6.4 (IPCC) VALORES ESTIMADOS DE DBO5 EN AGUAS RESIDUALES DOMESTICAS EN REGIONES Y PAISES SELECCIONADOS			
País/Región	BOD_5 (g/persona/día)	Rango	Referencia
Africa	37	35 – 45	1
Egipto	34	27 – 41	1
Asia, Oriente Medio, América Latina	40	35 – 45	1
Nota: Estos valores se basan en la literatura. Favor de usar valores nacionales, si están disponibles. Referencia: 1. Doorn and Liles (1999).			

TOW = P * 40* 0.001*1*365 = 14.6 kg/persona/año

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

CH_4 *Generación* = 0.06 * 14.6 =0.876 kg/persona/año

Se muestra en el cuadro siguiente el potencial de generación anual de CH_4 a partir de las aguas residuales domésticas.

Cuadro 5-9 : Potencial de Generación Anual de CH_4 (Aguas Residuales Domésticas)

Provincia	Población(2010) (Fuente : Oficina Nacional Estadística)	TOW (kg/año)	Potencial de Generación Annual de CH_4 (ton/año)
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
BARAHONA	200,602	2,928,789	175.7

Provincia	Población(2010) (Fuente : Oficina Nacional Estadística)	TOW (kg/año)	Potencial de Generación Annual de CH_4 (ton/año)
INDEPENDENCIA	55,223	806,256	48.4
PEDERNALES	25,478	371,979	22.3

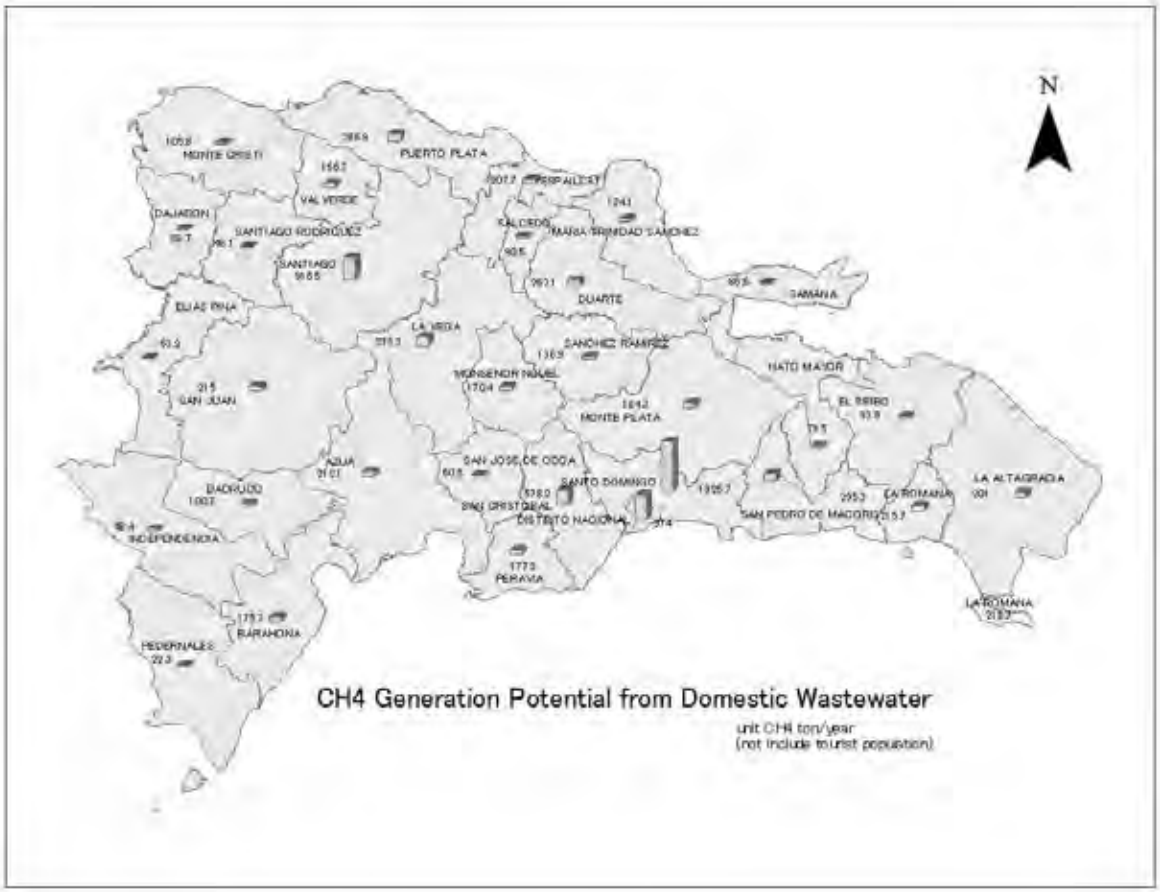


Figura 5-7 : Potencial de Generación de CH_4 a partir de Aguas Residuales Domésticas

2. PINs y PDDs Modelo

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.

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

	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 Chemtum 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.

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

	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 900 c/u Desecho disponible 120 m^3/dia Produccion de biogas 100 m^3/dia Consumo de biogas 5 m^3/KWh Produccion de electricidad 20 kWh/dia Metano (CH4) evitado Contenido medio de metano en biogas 0,60 Volumen evitado de metano 60,0 m^3/dia Densidad de metano 0,71 kg/m^3 Emision evitada de metano 42,6 kg/dia CO2 evitado Calentamiento de CH_4 en relacion al CO_2 21 Equivalencia en CO2 del metano evitado (a) 894,6 kg de CO_2/dia Indice de emision del sistema interconectado 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. ADOPELI 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) Total project costs	0.2 US$ million (Legal, consulting, etc.) – **legal aspects of included farms.** **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[1], 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

[1] 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 $C0_2$ 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[2].

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			

[2] 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] %

(4) Fuel switch in cocoa processing factories

Name of the project: **"Migration to Natural Gas in the plant processor of cocoa of CONACADO Inc."**

Technical summary of the project

Objective of the project	The project gas aim to reduce the emissions of greenhouse gas (GHG's) in the cocoa and chocolate production cocoa plant processor of CONACADO Inc. The main benefit looked for in the development of the project is to migrate the energy demand in the cocoa production plant of CONACADO from diesel to Natural Gas, using high efficiency equipment. CONACADO produces powder cocoa of high quality and environmental respect. The objective of the project developer is to reduce the most the possible impact of its industrial activities and Reducing GHG's emissions to the atmosphere. The project would be developed in San Francisco de Macorís, in a region where the industrial activity needs private electricity generation from diesel engine, to guarantee a constant supplying of energy. This type of project is first of its kind in cocoa industry in the country. For emission reduction, calculations we will take into consideration only switching from diesel engine to natural gas 750 KW of installed capacity, and no other added capacity if it were installed.
Description and propose activities.	The propose activities imply the development of feasibility study to make the substitution of the diesel engine by natural gas, as well as the execution of the project. Will be necessary to replace a 750 kW diesel generator that operates as main generator in the plant, by a generator of 1 MW of natural gas. Also, they will settle the necessary equipment for the reception and storage of the Liquid Natural Gas Compressed Natural Gas (according to the provision agreement that may be agreed).
Technology that will be used	The technology to be used is detailed below: • Storage Equipment . • Expansion/regasification of the gas. • Engine/generator of electricity 1MW from Natural Gas. The project looks for additional financing like the carbon credits of Kyoto Protocol's CDM flexible mechanisms. Obtaining this additional financing may allow CONACADO to develop this project, as actually the developer has to face extraordinary financial efforts to pursuit this investment. CONACADO Inc. seeks with this Project to reduce GHG emissions in their industrial facility. GHG calculations will be given according to the small scale methodology AMS-III.B version 13 "Switching fossil fuels"

Developer of the Project	
Name of the Project Developer	**INC. CONACADO**
Type of Organization	Public Institution
Another (s) function (s) of the Promoting Entity Organization in the project	Developer and Sponsor.
Summary of the most relevant experience of the Promoting Entity Organization in the project	CONACADO is a cooperative dedicated to the organic cocoa production, being the main exporter of organic fermented cocoa type "*Hispaniola*" for the European Union and the United States. CONACADO is formed by more than 8.500 affiliated, which are dust shareholders, CONACADO Inc.
Complete Address	Transito Street N° 1, Piedra Blanca, Haina, SC Dominican Republic
Person to whom to contact	Isidoro de la Rosa, General Manager
Telephone/fax	Telf.: (+1) 809 957-6203
Electronic mail/page Web	Email isidoro@conacado.com
Investors of the project	
(To provide the following information on each one of the investors)	
Name of the investor	INC. CONACADO
Type of Organization	Cooperative Company.
Complete direction (to include electronic direction, if there is it)	Transito Street N° 1, Piedra Blanca, Haina, SC Dominican Republic
Main activities	Production of powder and grain cocoa beans and exportation.
Summary of the financial statement of the Organization	*N/A*
Type of project	
Greenhouse Gases (GHG) that reduces the project	CO_2
Tipo of activities	Fuel switch for the electricity production.
Field of activities:	N/A
Production of energy	IF
Demand of energy	N/A
Transport	N/A
Handling of wastes	N/A
Others	N/A
Location of the project	
Region	Central America and the Caribbean
Country	Dominican Republic
City	San Francisco de Macorís.
Brief description of (s) the location (s) of the plant (s) or place (s) where would be implanted the project	The plant is located in San Francisco de Macorís, about 100 kilometers Northwest of the capital, Santo Domingo. San Francisco de Macorís is the third biggest city of the Dominican Republic and capital of Duarte province. It is located in the region "Eastern Cibao". The project will be located in the cocoa production plant of CONACADO Inc. in San Francisco de Macorís.
Map of location	Km. 2 ½ of the San Francisco de Macorís highway - Tenares, almost as opposed to entrance towards NORDESTANA University and behind a packer LPG "Coral Gas" . Coordinates: 19° 19 ' 24,37 North ". 70° 16 ' 34,87 West.
Programming of the project	

Date of beginning	Mayo 2009
Expected date for the first delivery of CER´s	2010
Life utility of the Project	10 years.
Current state or phase of the project	Planning
Current state of the approval of the country Host.	In process.
The position of the Country Host with respect to the Kyoto Protocol.	Dominican Republic ratified the agreement of UNFCCC in June 12 1992 and the Kyoto Protocol in October 7 1998. The National Office of Clean Development Mechanism, by decree 601-08, was credited as Designated National Authority in September 20th 2008.

B. Expected environmental and social benefits

Estimated greenhouse gases reduced/CO_2 captured (in metric tons of CO_2- equivalent)	Annual: 1,700 tCO_2- equivalent Until 2012 included: 6,200 tCO_2- equivalent Until a 10 years period : 17,000 tCO_2- equivalent
Scene of the Baselines	Given the important effort of investment that implies the project, not registering as CDM and obtaining the additional financing of the CER' s sale, CONACADO would continue generating electricity with the current generation equipment, without having to make any investment in new equipment.
	The project contributes to the sustainable development through different ways. Among others we emphasized:
Local benefits	The current project would contribute to the generation of local jobs for the installation and maintenance of the Natural Gas equipment. It will allow serving as example for the surrounding industries, migrating to less carbon-intensive fuels and industrial processes with lower Environment impact. An important reduction in the surrounding noise of the plant in electrical generation is estimated, when migrating to more efficient fuels and using state-of-art technology equipment. Additionally it is considered that CONACADO may improve its cash flows in the future, with the important implication of this in the economy of more than 8.500 producers of organic cocoa beans in the country affiliated with CONACADO Inc.
Global benefits	The main benefit of the project will consist in the improvement of the air quality, when diminishing the emissions average of greenhouse gases due to the electricity production with less carbon-intensive fuels like the natural gas.
Socioeconomic aspects	
Which would be the possible direct influences (for example: creation of jobs, required capital, foreign interchange)?	With the installation of this new equipment and maintenance new jobs will be needed.
Which would be other possible effects (for example: qualification and/or education associated with the introduction of new processes, technologies and products/the effects of a project in	It will be carried out advanced training courses for the workers who will carry out the project. In order to develop the project a technology will be used that is more respectful with environment and the extension in the use of a modern technology in the industrial electricity generation.

other industries)?	
Environmental strategy/development sustainable	According to sustainable development strategy for of the Ministry of State of Environment and Natural Resources and the National Council for the Climatic Change and the Clean Development Mechanism.

A. Financing

Estimated total cost of the project	
Development of the project	In negotiation
Identified financing sources or probable	
Capital	In negotiation
Contribution CDM Looked for	306.000 USD by 10 years.
Advanced CDM contribution.	N/A
Sources of income via CER.	
Indicative price of the CER (subject to negotiation)	18 US$/ton CO_{2e}
Amount of the value in the agreements sales to future expected and/or done	Without agreement

PDD Modelo 1

Renewable energy development through synthesis gas production and utilization (PoA-DD)

SECTION A. General Description of small-scale programme of activities (POA)

A.1 Title of the small-scale programme of activities (POA):

Renewable energy development through synthesis gas power generation from biomass resources in the Dominican Republic Version 1.

→Agreed or need some change?

A.2 Description of the programme of activities:

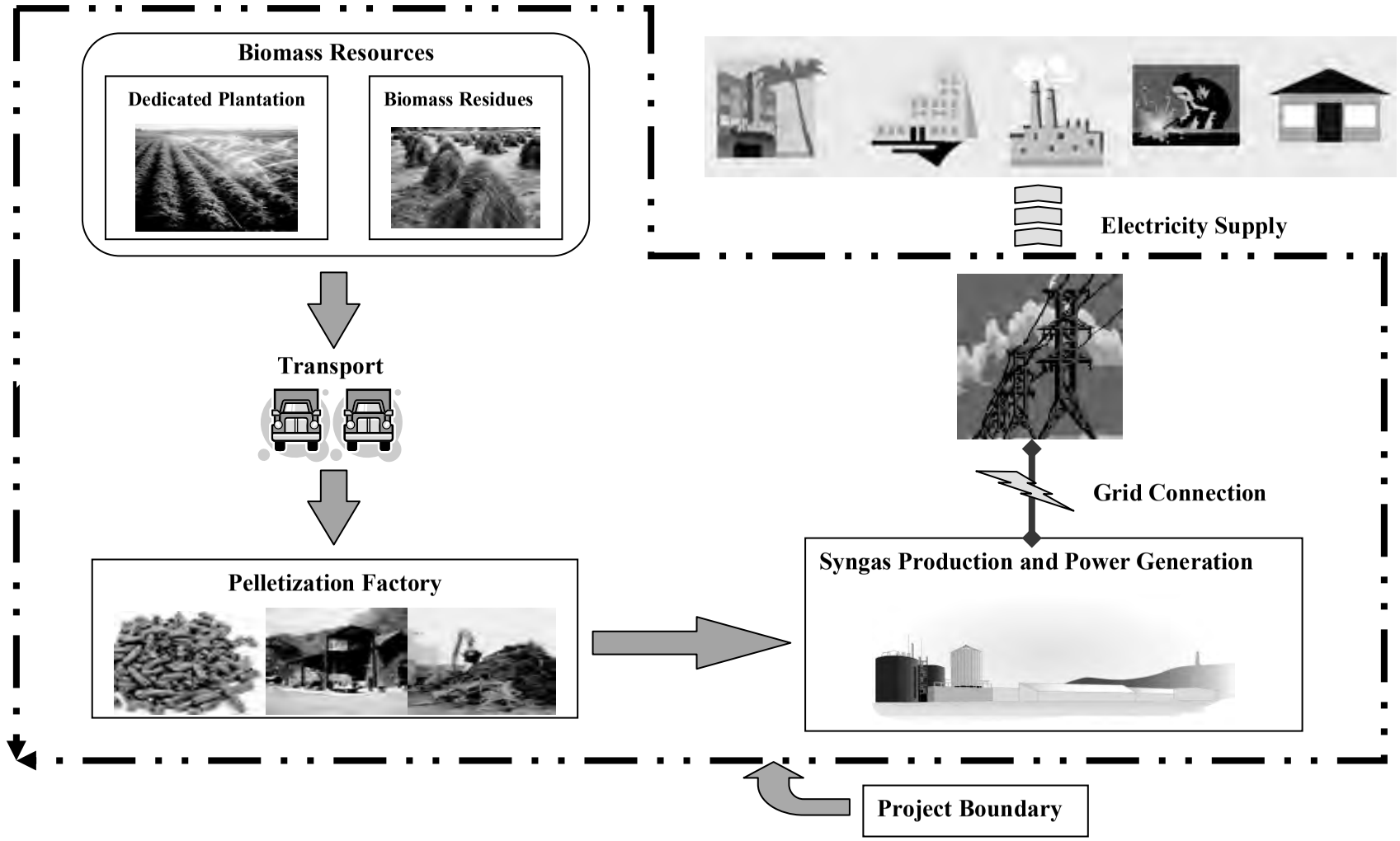
1. General operating and implementing framework of POA

The POA has to clarify the followings to determine the general operating and implementing framework of POA:

✧ Roles of relevant stakeholders

Stakeholders	Roles
KOAR Energy Resources	▪ Formulate and develop CPAs ▪ Application for registration of pCDM project ▪ Owner of each CPA ▪ Construct and operate syngas production plant ▪ Construct and operate gas power generation plant ▪ Connection to the national grid electricity
CDEEE	▪ Purchasing electricity from KOAR
Biomass resources supplier (Who to be included?)	▪ Grow and supply biomass resources ▪ Collect and transport biomass resources/residues
Project Monitoring Body (Who?	▪ Project Monitoring and reporting to CDM-EB for CER issuance request

✧ Project operation and implementation framework (draft)



(Description sample)

The KOAR Energy Resources Dominicana (KOAR), the USA-based multinational renewable energy production company, will be the coordinating and managing entity of the POA. It will construct and operate synthesis gas power generation facilities to be developed as individual CPAs. The generated electricity will be sold to the Dominican State-Owned Power Company (CDEEE), through grid connection, in accordance with the power purchase agreement to be finally concluded once the Project is officially registered as the programmatic CDM. The biomass resources to be utilized for synthesis gas power generation include biomass residues from agriculture and industry while KOAR will also develop dedicated plantations of tropical grasses for stable biomass resource supply to the facilities by cultivating the abandoned lands in the country. The Dominican Agrarian Institute will cooperate with KOAR in establishing the stable biomass supply logistic network while it also encourages farmers to participate in development of the dedicated plantations of tropical grasses. As the 1st phase of the Project, KOAR plans to develop synthesis gas power generation units of 15MW installed capacity in 3 different locations that have already been identified. The 1st phase is expected to be completed by mid-2010 and will be further expanded to other areas in the Dominican Republic in subsequent years.

2. Policy/measure or stated goal of the PoA

The Project aims at developing renewable energy in the Dominican Republic through multiple installation and operation of biomass-based synthesis gas power generation. The Project is expected to help achieving the national policy target of renewable energy development to cover 20% of the total energy demand in the country.

The Dominican Republic currently depends strongly upon heavy oil for national electricity generation and supply. The project will also develop the opportunities of diversifying the country's energy resources through introduction of the new technology of producing synthesis gas from various biomass residues and resources.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

Although the Government of Dominican Republic (GoDR) has the policy target of renewable energy development, there is no mandate provided in any legal or regulatory form to develop or utilize renewable energy. Private sector participation in power sector has been promoted by GoDR since mid-1990s including renewable energy resources utilization; however, it does not mandate the use of renewable energy resources, but promotes, in the same manner, non-renewable ones including fossil fuel, which cost much less than renewables.

KOAR Energy Resources, the Project developer and operator, is one of the independent power producers, trying to introduce its own unique renewable energy development technology of producing synthesis gas from various biomass residues to generate electricity. The Programme is planned and implemented by KOAR on voluntary basis under non-mandatory conditions.

Not only that the Programme promotes the development of renewable energy utilization, it also contributes to the sustainable development of the Dominican Republic by producing the following socio-economic and environmental benefits:

Socio-Economic Benefits

- Creation of new job opportunities to the local economy (power plant operation workers, handling and transport of biomass residues for the use as fuels, etc.);
- Generating additional incomes of agricultural farmers through purchasing of their residues;
- Supporting the development of local economy through securing stable power supply to the residential, commercial and industrial users;

- Providing an alternative of energy resource development in the country through introduction of biomass fuel conversion and utilization technology; and
- Development of new plantations in degraded and abandoned lands, by working together with sugarcane colons in the development of energy crops.

Environmental Benefits

- Reduction of greenhouse gas emissions resulting from the power generation heavily depending upon imported fossil fuels;
- Mitigation of air pollution resulting from open burning of agricultural residues currently dominant in the country; and
- Providing solutions to the handling of agricultural waste through its efficient utilization as biomass-based energy.

A.3 Coordinating/managing entity and participants of POA:

1. Coordinating or managing entity of the PoA as the entity which communicates with the Board

KOAR Energy Resources

2. Project participants being registered in relation to the PoA

Name of Party Involved	Private and/or public entity (ies) project participants (as applicable	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of the Dominican Republic	**Private Entity** KOAR Energy Resources	No

Do we need to add more participants to be included such as :

- **CDEEE**
- **The Dominican Agrarian Institute**
- **Biomass residue suppliers (inc. pelletization)**

A.4. Technical description of the small-scale programme of activities:

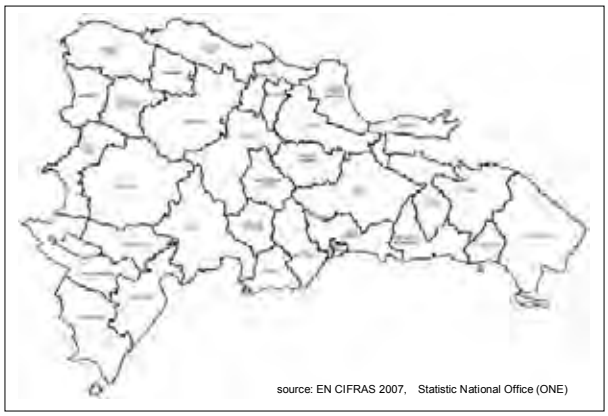
A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

The Dominican Republic

A.4.1.2. Physical/Geographical boundary:

The PoA of the Project will cover the whole country of the Dominican Republic, which is located at 68º 19´ to 72º 01´ longitude west and 17º 36´ to 19º 58´ latitude north. The Dominican Republic shares with Haiti the island called La Hispaniola, which forms jointly with Cuba, Jamaica, and Puerto Rico the so called Great Antilles. La Hispaniola has an area of approximately 77,914 km^2, out of this area 48,442 km^2 belongs to the Dominican Republic. The country is divided into 31 provinces and a National District. The National District is where the capital city of the country, Santo Domingo is located. The total population of the country is about 9.9 million in 2010.



We may need to show the location of the 1st CPA.

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

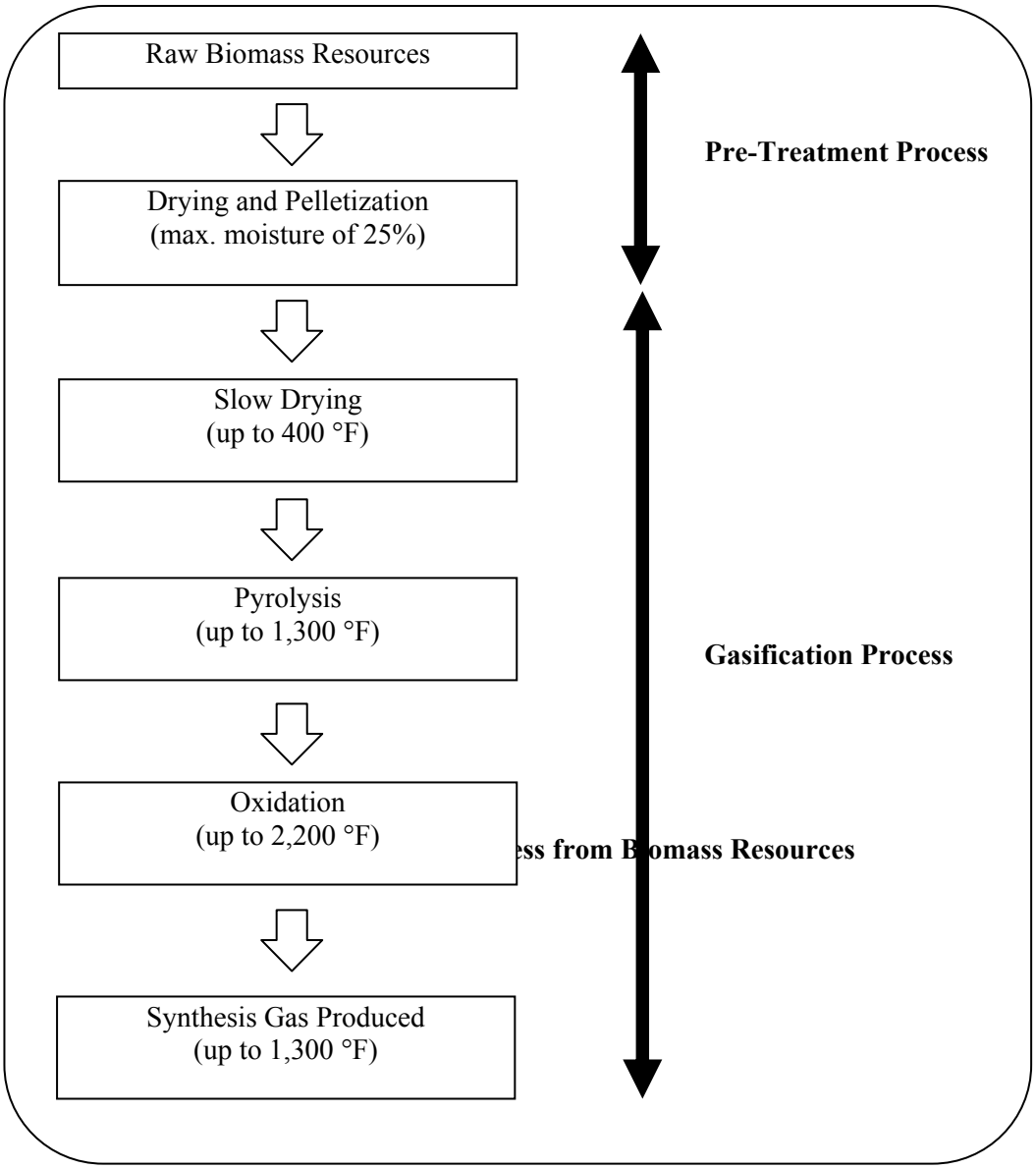
The Technology to be employed by the SSC-CPA is a combination of biomass-based synthesis gas production and power generation processes. The synthesis gas is produced from various biomass resources through so-called gasification process.

Gasification is a process that converts carbonaceous materials, such as coal, petroleum, bio-fuel, or biomass, into carbon monoxide and hydrogen by reacting the raw material at high temperatures with a controlled amount of oxygen and/or steam. The resulting gas mixture is called synthesis gas or syngas and is itself a fuel. Gasification is a method for extracting energy from many different types of organic materials.

Syngas may be burned directly in internal combustion engines, used to produce methanol and hydrogen, or converted into synthetic fuel. Gasification can also begin with materials that are not otherwise useful fuels, such as biomass or organic waste. In addition, the high-temperature combustion refines out corrosive ash elements such as chloride and potassium, allowing clean gas production from otherwise problematic fuels.

Gasification relies on chemical processes at elevated temperatures of above 700°C, which distinguishes it from biological processes such as anaerobic digestion that produce biogas.

Before feeding the biomass resources into gasification process, they are mechanically processed into uniformly sized pellets. The gasification process itself proceeds as shown in the figure on next page. The synthesis gas produced is utilized for power generation with internal combustion engines. The generated electricity will be sold to the national grid with grid connection.



A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA :

The Project defines the following criteria for inclusion of a project activity as a CPA under POA.

- A synthesis gas production and power generation project to be newly developed by KOAR Energy Resources with biomass as energy resources with the same technology introduced in A.4.2.1 above.
- The project activity is located within the national territory of the Dominican Republic.
- Power generation capacity of the project activity is complied with the eligibility criteria for definition of small scale CDM project.
- The project activity applies the same methodology for estimating emission reduction of greenhouse gases as described in E.6
- The project activity monitors and collects appropriate data and information in accordance with the parameters listed in A.4.4.2

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality:

Although the Government of the Dominican Republic is promoting development of renewable energy-based power generation, there is no obligation or mandate that enforces the electricity generation companies to develop power generation from biomass residues. In addition, there is no legal, regulatory or any other policy incentives to discourage the use of non-renewable energy resources such as fossil fuels. The most financially and economically profitable methods of power generation in the Dominican Republic is the utilization of local coal if it is developed at this scale of generation capacity.

On the other hand, the technology to be introduced by the proposed project is the first of its kind in the country. It has significant technology barriers in relation to handling and collection of biomass resources to fit as the materials for synthesis gas production. Current common practice of open burning of biomass residues also needs to be modified by coordinated education and training of the farmers. Furthermore, the project has to develop a complete new factory within the country so as to enable an economically viable manufacturing of gasifiers, implying an enormous effort to KOAR, their partners and subsidiaries to build local capacities in manufacturing and operating this newly introduced gasifiers.

Thus, the current situation of energy and power generation and common practices of handling biomass resources clearly supports that the proposed project activity can only be developed as the voluntary action of the coordinated entity.

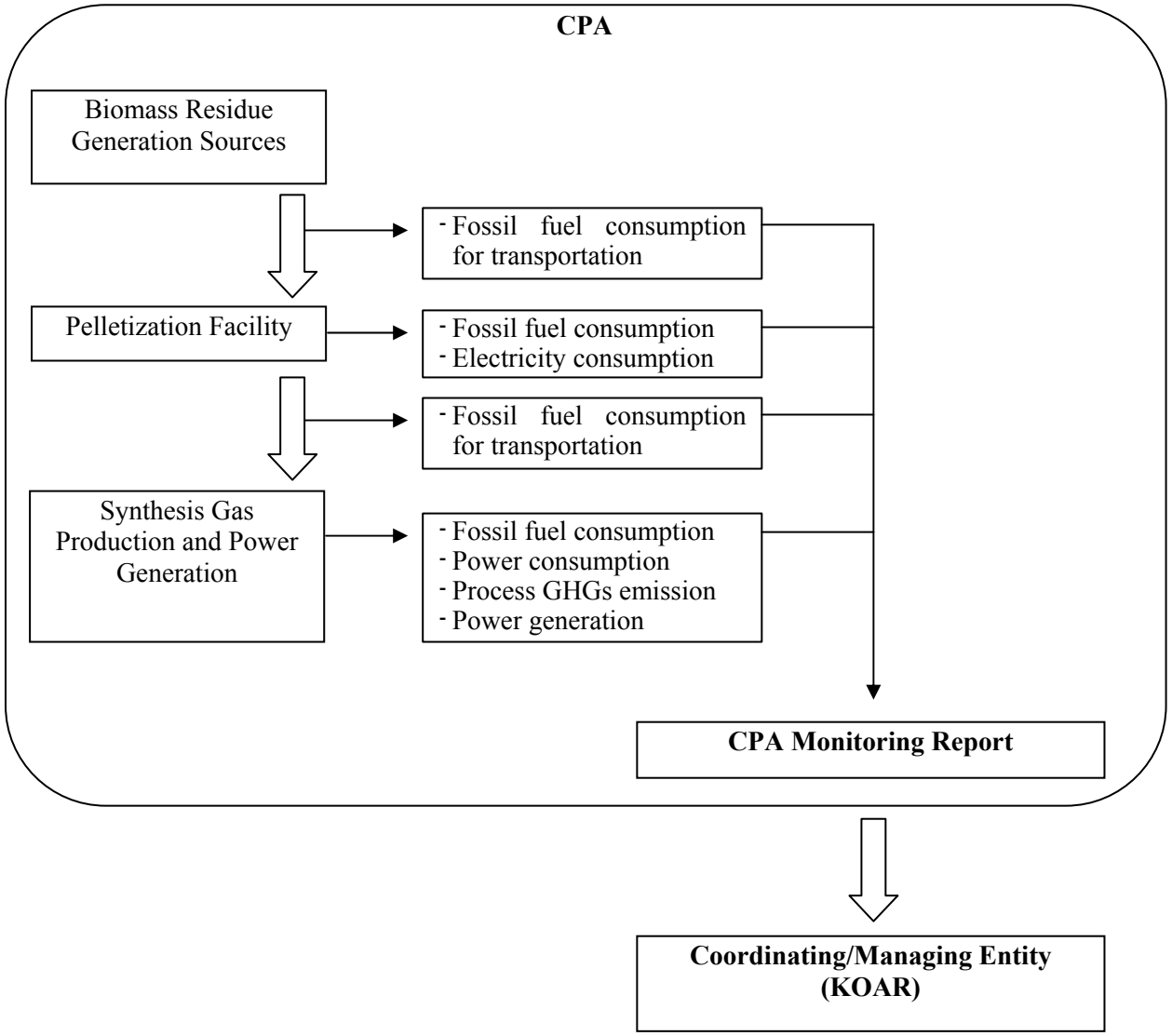
A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The following operational and management arrangements will be made by the KOAR for implementation of the POA.

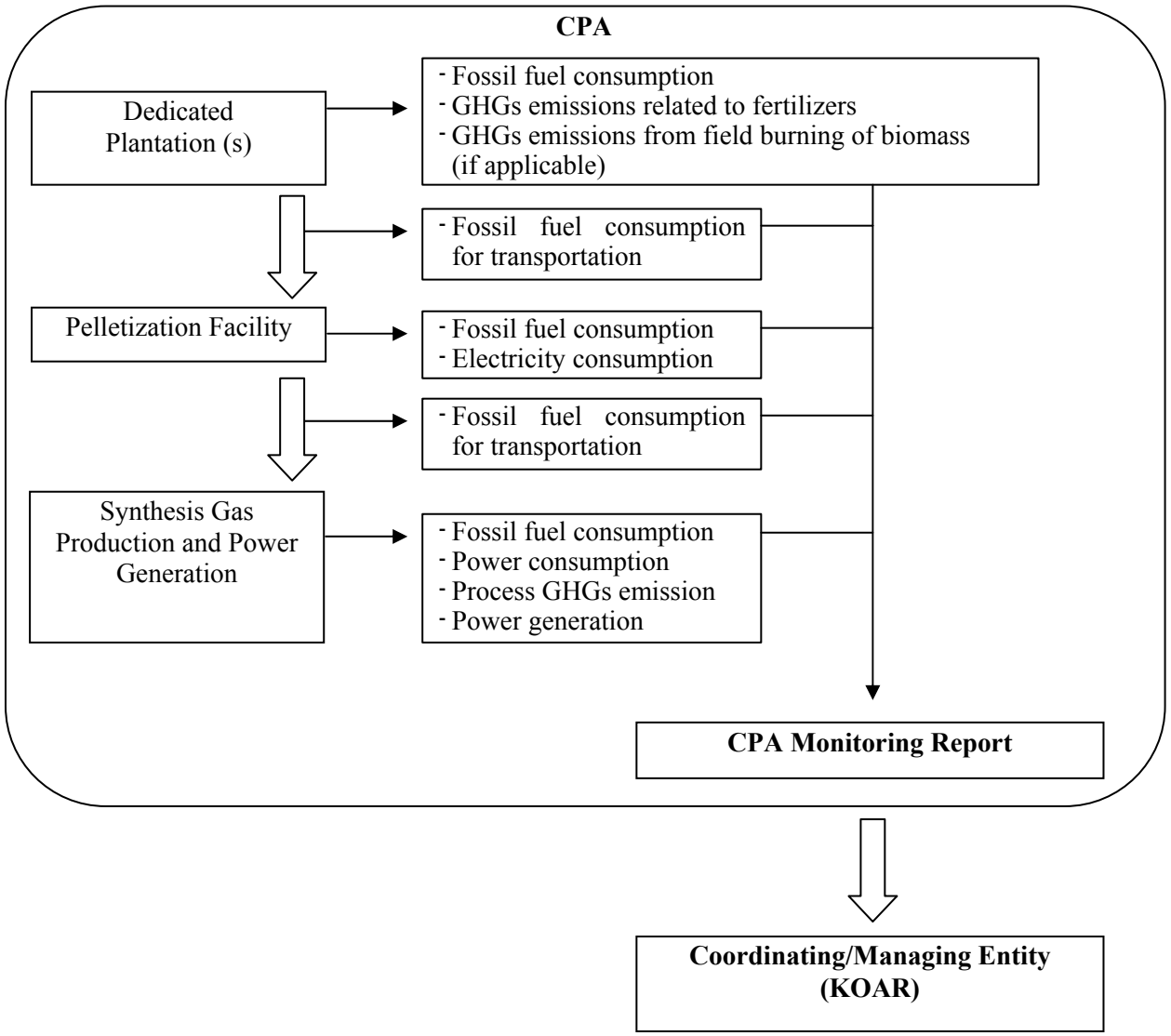
(i) A record keeping system for each CPA under POA
Regular monitoring and recording of specific parameters required in the monitoring plan of PoA will be carried out at each individual level of CPAs, where the data will be collected and digitally compiled.

(Case 1: Use of biomass residues as resources for power generation)
In the case of utilizing biomass residues for synthesis gas production and power generation, the record keeping will be made at each level of CPA as shown below.



Monitoring and record keeping will be made by each CPA, in which the operation body of synthesis gas and power generation facilities is responsible for compiling all the data and records into CPA monitoring report annually.

(Case 2: Use of biomass from dedicated plantations)
In the case of utilizing biomass from dedicated plantation, the record keeping will be made at each level of CPA as shown below.



In Case 2, additional data needs to be collected and kept in relation to the GHGs emissions from the dedicated plantations in accordance with the approved baseline and monitoring methodology AM0042.

The KOAR Energy Resources, as the Coordinating/Management Entity (CME) of the PoA will keep and compile the monitoring reports sent by each CPA. KOAR will establish a centralized electronic database system to regularly monitor and supervise operation of all the facilities within the boundary of each CPA. KOAR will be fully responsible for collecting, storing and analyzing the data from all CPAs.

(ii) A system/procedure to avoid double accounting

To avoid double accounting of CPAs and relevant data to be obtained by project monitoring activities, each CPA will be listed by the CME with a specific name, serial number and geographical location reference (latitude and longitude) of each facility (plantation, pelletization, gasifier, power generation). Each of the trucks utilized for transport of biomass will also be registered under CPA with the specified code provided. The table below shows an example of CPA coding system.

An Example of CPA coding system

Item	Example of Coding
CPA serial number	CPA001
Plantation	CPA001/P001 ~ CPA001/P00x (sequential number)
Truck	CPA001/T001 ~ CPA001/T00x (sequential number)
Pelletization Facility	CPA001/PE001 ~ CPA001/PE00x (sequential number)
Gasifier	CPA001/G001 ~ CPA001/G00x (sequential number)
Power generation	CPA001/PG001 ~ CPA001/PG00x (sequential number)

Each CPA will be profiled with the following information in the database established by KOAR as the CME of this PoA. A CPA will be profiled with the information and data specified in the table below.

An Example of CPA Profile

Item	Specification	
CPA serial number	CPA001	
CPA Title/Name	CPA Santo Domingo 1	
Gasifier	Serial Number	CPA001/G001
	Location	latitude: longitude:
	Production Capacity	BTU/hour
Power Generator	Serial Number	CPA001/PG001
	Location	latitude: longitude:
	Generation Capacity	KW
Pelletization	Serial Number	CPA001/P001
	Location	latitude: longitude:
	Production Capacity	M^3/hour
Trucks	Serial Number	CPA001/T001
	Registered number	Xxxxx
	HP	
	Loading capacity	
	Serial Number	CPA001/T002
	Registered number	Xxxxx
	HP	
	Loading capacity	
Plantation	Serial Number	CPA001/P001
	Location	latitude: longitude:
	Plantation Area	ha
	Serial Number	CPA001/P002
	Location	latitude: longitude:
	Plantation Area	ha

The monitoring data will be sent to the CME in electronic files or writing and stored in the database in accordance with the given serial number to avoid double counting of the data and information.

The detailed monitoring methods at each of facilities and equipment are mentioned in E.7.1 and E7.2.

(iii) Verification that SSC-CPA is not a debundled component of another CPA
Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities provides that a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

In the case of the current PoA, KOAR will be the main project participants in all CPAs. All the CPAs will be in the same project category and use same technology/measures. In addition, most of the CPAs under this proposed PoA will be carried out within the period of 2 to 3 years. Therefore, geographical location of each CPA will be clearly identified to measure the distance with the other CPAs for the purpose of assuring that the project boundary is not within the 1 km of the project boundary of the other CPAs at the closest point.

If all the above criteria are met by a single CPA, it is deemed to be a debundled component of another CPA. In such a case, the total size of that CPA combined with the previously registered CPA is calculated to assess if it exceeds the limits for small-scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7. In the case of the current PoA, it will not be considered as a single CPA if the total power generation capacity of the CPA combined with the previously registered one exceeds 15 MW.

(iv) Assurance that CPA operations/operators are being subscribed to the PoA
In every CPA of the current PoA, synthesis gas production is managed by a single project participant, KOAR. Although some of power plant operation will be sub-contracted out to the other power generation companies, KOAR will always make contracts with them who officially agreed to carry out their operation as the CPA of the current PoA.

A.4.4.2. Monitoring plan:

In the proposed PoA, the coordinating/management entity opts for a verification method that does not use sampling but verifies each CPA. As mentioned in A.4.4.1 above, no double accounting of any CPAs by properly encoding each CPA in accordance with the coding system described in (ii) of A.4.4.1. The status of verification can also be determined anytime for each CPA.

A.4.5. Public funding of the programme of activities (PoA):

No public funding is used in this PoA. KOAR will self-finance all the CPAs under this PoA if the PoA is registered as the programmatic CDM.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

The starting date of the PoA is the date of its official registration.

B.2. Length of the programme of activities (PoA):

The length of the PoA is 28 years from the starting date of the PoA.

SECTION C. Enviromental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environment analysis is undertaken:

1. Environmental Analysis is done at PoA level □
2. **Environmental Analysis is done at SSC-CPA level** ■

As the relevant environment laws and regulations in the Dominican Republic requires a environmental analysis for this type of activity at this scale, the environmental analysis is done at SSC-CPA level.

C.2. Documentation on the analysis of the environmental impacts, including transboudary impacts:

→This part needs to be written by KOAR.

C.3. Please state whether in accordance with the host party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

The laws and regulations in the Dominican Republic requires an environmental impact assessment for a typical CPA to be included in the programme of activities proposed here.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level □
2. **Local stakeholder consultation is done at SSC-CPA level** ■

As the environment impact assessment procedure requires the process of public consultation at each SSC-CPA level of this type, the local stakeholder consultation is also done at SSC-CPA level.

→This part needs to be confirmed.

D.2. Brief description of how comments by local stakeholders have been invited and compiled:

→This part will be described after the actual activities of local stakeholder consultations.

D.3. Summary of the comments received:

→This part will be described after the actual activities of local stakeholder consultations.

D.4. Report on how due account was taken of any comments received:

→This part will be described after the actual activities of local stakeholder consultations.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved baseline methodology applied to each CPA included in the PoA:

AMS-I.D. "Grid connected renewable electricity generation (Version 15)" was applied as the baseline and monitoring methodology of each CPA included in this PoA. "Tools to calculate the emission factor for an electricity system" and AM0042 "Grid-connected electricity generation using biomass from newly developed dedicated plantations (Verison 02)" are also used as the references to AMS-I.D.

In addition to the above, the following methodological tools are also utilized in relation to application of a baseline and monitoring methodology.

- Combined tool to identify the baseline scenario and demonstrate additionality, and
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption

E.2. Justification of the choice of the methodology and why it is applicable to each CPA:

Choice and application of the methodology AMS-I.D. for the Project is justified as follows:

1. The Project comprises renewable energy generation units, i.e. renewable biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit,

2. The capacity of the entire unit in the Project shall not exceed the limit of 15MW, to be defined as a small-scale CDM project,

3. The Project does not have combined heat and power systems.

In addition to the justification above, the Project is required to comply with the following condition so as to be carried out as the Project activity under a PoA:

- In the specific case of biomass project activities, the applicability of the methodology is limited to either project activities that use biomass residues only or biomass from dedicated plantations complying with the applicability conditions of AM0042.

The Project uses biomass from dedicated plantations while it fully complies with the applicability conditions of AM0042 as mentioned in the table below:

Required Conditions	Compliance
▪ The project activity involves the installation of a new grid-connected power plant that is mainly fired with renewable biomass from a dedicated	▪ Each CPA involves the development of grid-connected power plant that utilizes renewable biomass from a dedicated plantation.

Required Conditions	Compliance
plantation (fossil fuels or other types of biomass may be co-fired)	
▪ Prior to the implementation of the project activity, no power was generated at the project site (i.e. the project plant does not substitute or amend any existing power generation at the project site)	▪ There is no power generation at the site of each CPA where the project plans to develop a power plant.
▪ The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available	▪ The geographic and system boundaries for relevant electricity grid to each CPA can be clearly identified with the information on the characteristics of the grid.
▪ Biomass used by the project facility is not stored for more than one year	▪ Each CPA will not store the biomass within the project facility for more than one year. Each CPA will prove it through documentation of the biomass storage data and records.
▪ The dedicated plantation must be newly established as part of the project activity for the purpose of supplying biomass exclusively to the project.	▪ The project participant, KOAR will develop the dedicated plantations that exclusively supplies biomass to the project.
▪ The biomass from the plantation is not chemically processed (e.g. esterification to produce biodiesel, production of alcohols from biomass, etc) prior to combustion in the project plant but it may be processed mechanically or be dried	▪ The biomass from the plantation is only dried and mechanically processed (pelletized) to fit into the synthesis gas production facility as the raw materials. No chemical processing is required for synthesis gas production.
▪ The site preparation does not cause longer-term net emissions from soil carbon. Carbon stocks in soil organic matter, litter and deadwood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity	▪ The site to be developed as the dedicated plantations will be the abandoned or barren lands where aboveground and soil carbon stocks will decrease more in the absence of the project activity.
▪ The land area of the dedicated plantation will be planted by direct planting and/or seeding	▪ Direct planting and/or seeding will be carried out on the land area of the dedicated plantations.
▪ After harvest, regeneration will occur either by direct planting or natural sprouting	▪ To maintain biomass supply to the project facility, the dedicated plantations will be regularly replanted to keep its regeneration.
▪ Grazing will not occur within the plantation	▪ No Grazing activity will occur within the plantations.
▪ No irrigation is undertaken for the biomass plantations	▪ No irrigation works is required for development of the dedicated plantations.
▪ The land area where the dedicated plantation will be established is, prior to project implementation, severely degraded and in absence of the project activity would have not been used for any other agricultural or forestry activity.	▪ The project will develop the dedicated plantations where the land is not currently used or abandoned and no planned agricultural or forestry activities.

Each CPA of the proposed PoA will be strictly tested with the above applicability conditions by reviewing the detail project design document prepared by KOAR.

E.3. Description of the sources of gases included in the SSC-CPA boundary:

In accordance with the Approved baseline and monitoring methodology AM0042, the sources of greenhouse gases included in the SSC-CPA boundary are as shown in the table below:

Source		Gas	Included?	Justification/Explanation
Baseline	Grid electricity generation	CO_2	Yes	
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	
Project Activity	On-site fuel consumption	CO_2	Yes	
		CH_4	No	Excluded for simplification. This emission source is assumed to be small.
		N_2O	No	
	Combustion of biomass (synthesis gas) for electricity generation	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes in carbon pools.
		CH_4	Yes	
		N_2O	No	Excluded for simplification. This emission source is assumed to be small.
	Off-site fossil fuel combustion for transportation of biomass to the project plant	CO_2	Yes	
		CH_4	No	Excluded for simplification. This emission source is assumed to be small.
		N_2O	No	
	Electricity consumption at the project site	CO_2	Yes	
		CH_4	No	Excluded for simplification. This emission source is assumed to be small.
		N_2O	No	
	Fertilizer Production	CO_2	Yes	
		CH_4	Yes	
		N_2O	Yes	
	Fertilizer application	N_2O	Yes	
	Field Burning of Biomass	CO_2	No	CO_2 emissions from biomass burning are assumed not lead to changes in carbon pools.
		CH_4	Yes	
		N_2O	Yes	

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario

In accordance with AMS-I.D. "Grid connected renewable electricity generation (Version 15)" and the Approved baseline and monitoring methodology AM0042, the baseline emissions are CO_2 emissions from the displacement of electricity generation in grid-connected fossil fuel fired power plants as long as the CDM project activity under the proposed PoA proves and demonstrate its additionality in compliance with the latest version of the "Tool for the

demonstration and assessment of additionality". In that case, the baseline CO_2 emission is calculated as follows:

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

Where

BE_y	=	Baseline emissions in year y (tCO_2/yr)
$EG_{pj,y}$	=	Net quantity of electricity generated in the project plant in year y (MWh/yr)
$EF_{grid,y}$	=	Grid emission factor in year y, monitored and calculated according to the latest approved version of the "Tool to calculate emission factor for an electricity system" (tCO_2/MWh)

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

In accordance with the Approved baseline and monitoring methodology AM0042 and the latest version the "Tool for the demonstration and assessment of additionality", the additionality of a typical CPA is demonstrated as follows:

Step 1. Identification of alternative scenarios to a typical CPA that are consistent with current laws and regulations

The alternative scenarios to a typical CPA that are consistent with the current laws and regulations are:

- The typical CPA is carried out without the CDM (with no CERs);
- Electricity generation from other non-biomass renewable sources;
- Electricity generation from fossil fuel combustion

All of the above are the alternative scenarios that are consistent with the current laws and regulations.

In addition to the above alternatives, since the proposed project activity will co-fire biomass residues, there are also the alternatives scenarios on the use of biomass residues in the absence of the typical CPA, as shown below:

B1 The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.
B2 The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.
B3 The biomass residues are burnt in an uncontrolled manner without utilizing them for energy purposes.
B4 The biomass residues are sold to other consumers in the market and the predominant use of the biomass residues in the region/country is for energy purposes (heat and/or power generation).
B5 The biomass residues are used as feedstock in a process (e.g. in the pulp and paper industry).
B6 The biomass residues are used as fertilizer
B7 The proposed project activity (the typical CPA) not undertaken as a CDM project activity (use of the biomass residues in the project plant).
B8 Any other use of the biomass residues

For all the biomass residues to be used in the typical CPA, the most plausible baseline scenario for the use of biomass residues shall be determined for each type and source of biomass separately. The respective biomass residue types, quantities and will also be documented transparently in the CDM SSC-CPA-DD.

Step 2. Investment analysis of the alternatives to the project activities

Remark:
According to the latest draft of "CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL", the PDD must provide evidence that the proposed project CDM project activity would not be:

(a) The most economically or financially attractive alternative; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs) through one of the following approaches, by demonstrating that

(a) The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income. Document the costs associated with the proposed CDM project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity;
(b) The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative;
(c) The financial returns of the proposed CDM project activity would be insufficient to justify the required investment.

In accordance with the latest version of the "Tool for the demonstration and assessment of additionality", the additionality of the CDM project activity under the proposed PoA is hereby demonstrated by proving that:

The proposed CDM project activity would not be economically or financially feasible without the revenue from the sale of certified emission reductions (CERs), through providing evidence that it is less economically or financially attractive at least one other credible and realistic alternative.

Step 2-1: Investment analysis of the alternatives to the CDM project activity under the proposed PoA

There are following alternatives that are consistent with the laws and regulations:

Alternative Scenario 1	**Electricity generation from non-biomass renewable sources**
Alternative Scenario 2	**Electricity generation from combustion of fossil fuels (coal, oil, natural gas)**
Alternative Scenario 3	**The proposed CPA without the CDM**

As the alternative scenario 3 is the proposed CDM projects activity without the CDM, the additionality of the proposed CDM project activity will be demonstrated if either of the alternative 1 or 2 is more economically or financially attractive than the alternative scenario 1.

The investment analysis is made by comparing the project internal rate of return (project IRR) of each alternative based on the clearly defined and transparent assumptions and estimations of income and expenses.

(Estimation of project IRR for Alternative Scenario 1)
In the case of alternative scenario 1, depending upon the locations of the individual CDM project activity under the proposed PoA, available non-biomass renewable energy resources may be different. In the case of the Dominican Republic, the potential non-biomass renewable resources to be developed as the alternative to the proposed CDM project activity will be hydro or wind power. No other non-biomass renewable resources can be developed within the country at the generation capacity of the proposed CDM project activity while it may be possible to develop similar scale of hydro or wind power generation instead of the proposed CDM project activity if such resources are available at the project site.

Therefore, assuming that there are sufficient potentials of hydro and wind power at the project site, the project IRR is estimated for hydro and wind power generation.

Assumptions for project IRR calculation in hydro and wind power generation
(1) Project income
For all renewable energy based power generation, the incentive is provided for selling of the generated electricity to the national grid with the preferential prices provided by Law 57-07 Incentive to Renewable Energy and Special Regimes. The project income in both hydro and wind power generation comes from selling the electricity to the grid with the preferential prices determined for each type of renewable energy source.
→Evidence must be shown in the annexes.
No other income than electricity sale is assumed in hydro and wind power generation.

(2) Project cost
The cost of the project is estimated for each of hydro and wind power generation project in accordance with the available information about the cost of facilities and their operations from the previous experience in the country.
→Evidence must be shown in the annexes.

(3) Project IRR estimation and comparison
In accordance with the "Guidance on the Assessment of Investment Analysis", the project IRR estimation will be made in compliance with the following guidances:

- Project IRR calculation shall reflect the period of expected operation of the underlying project activity (technical lifetime), or – if a shorter period is chosen – include the fair value of the project activity assets at the end of the assessment period.
- The fair value of any project activity assets at the end of the assessment period shall be included as a cash inflow in the final year of the assessment period.

(Estimation of project IRR for Alternative Scenario 2)
In the case of alternative scenario 2, there are options of utilizing fossil fuels (coal, oil or natural gas) for power generation. Therefore, project IRR calculation will be made for 3 options of fossil fuel-fired power generation comprising of the case utilizing coal, oil, and gas respectively.

Assumptions for project IRR calculation in Alternative Scenario 2
(1) Project income
→How we can determine or estimate the project income in the case of fossil fuel-fired power generation? (Is it possible for a private entity to sell to the grid the electricity generated from fossil fuel-fired power plant?)

(2) Project Cost
The cost of the project is estimated for each option of fossil fuel-fired power generation with different types of fuels (coal, oil and natural gas) in accordance with the available information about the cost of facilities and their operations from the previous experience in the country.

(3) Project IRR estimation and comparison
Project IRR estimation will be made in the same way as the case of alternative scenario 1 above.

(Estimation of project IRR for Alternative Scenario 3)
In the case of alternative scenario 3, the estimation is made as follows:

Assumptions for project IRR calculation in the typical CPA under the proposed PoA without CDM
(1) Project income
In the case without CDM, the only income of the typical CPA under the proposed PoA will come from selling the generated electricity to the national grid. No other income is expected from the project activity.
→Evidence must be shown in the annexes.

(2) Project cost
The cost of the CDM project activity under the proposed PoA will be as follows:
→need to be specified by major cost items
→Evidence must be shown in the annexes.

(3) Project IRR estimation and comparison
Project IRR estimation will be made in the same way as the case of alternative scenario

The results of project IRR estimation for each alternative scenario are shown in the table below:

Alternatives	Project IRR	
	10 years	20 years
Alternative 1		
Hydropower		
Wind power		
Alternative 2		
Coal		
Oil		
Gas		
Alternative 3		

As shown in the table above, there are clearly more economically and financially attractive alternative scenarios than the typical CPA in the case without CDM, which is xxxxxx. Therefore, the typical CPA under the proposed PoA is demonstrated additional to the baseline.

Step 2-2: Analysis of the alternative scenarios on the use of biomass residues to the typical CPA under the proposed PoA

Remark
In this step, each CPA must identify, for each type of biomass residues used, the most plausible and credible scenario for what would happen to the biomass residues in the absence of the project activity. The examples of the alternative scenarios include, but are not limited to:

B1 The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.
B2 The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.
B3 The biomass residues are burnt in an uncontrolled manner without utilizing them for energy

purposes.

B4 The biomass residues are sold to other consumers in the market and the predominant use of the biomass residues in the region/country is for energy purposes (heat and/or power generation).

B5 The biomass residues are used as feedstock in a process (e.g. in the pulp and paper industry).

B6 The biomass residues are used as fertilizer

B7 The proposed project activity (the typical CPA) not undertaken as a CDM project activity (use of the biomass residues in the project plant).

B8 Any other use of the biomass residues

Depending upon the scenario to be selected from the above, the methods of calculating project and leakage emission may be different

Step 3. Barrier Analysis

The typical CDM project Activity (CPA) under the proposed PoA faces the following barriers against its implementation in the absence of CDM.

(a) Investment barrier

Remark:

Based on the result of investment analysis made in Step 2 above, the project proponent is required to show that there is at least one more economically and/or financially viable alternative to the typical CPA that would have led to higher emissions of GHGs.

The best practice examples of proving the investment barriers include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of benchmark analysis or simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency).

(b) Access-to-finance barrier

Remark:

If possible, the project proponent is encouraged to obtain a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan to the project.

(c) Technological barrier

Remark:

The best practice examples of showing technological barrier include the demonstration of non-availability of human capacity to operate and maintain the technology, lack of infrastructure to utilize the technology, unavailability of the technology and high level of technology risk.

In the case of KOAR project, it is possible to demonstrate non-availability of human capacity to operate and maintain syngas production technology since it is the first of its kind in the country. It is also possible to demonstrate the lack o infrastructure to utilize the technology since there is no experience of developing the dedicated plantations to exclusively supply biomass for energy production. It is also the first trial in the country to use tropical glasses for energy production. All of these facts lead to higher level of technology risk.

(d) Barrier due to prevailing practice

Remark:
The best practice examples include but are not limited to, the demonstration that the project is among the first of its kind in terms of technology, geography, sector, type of investment and investor, market etc.

In the case of KOAR project, it can be demonstrated that the typical CPA is among the first of its kind in terms of using the gasification technology for energy and power generation from biomass. This is also the first private sector investment in biomass fueled power generation in the country. It is also the first experience in the country to develop dedicated plantations to exclusively supply biomass resources for energy purposes.

Another important barrier is the prevailing practice of handling biomass residues in the country. Open burning is the most dominant treatment of biomass residues from agricultural activities; therefore, it is necessary to change the behavior of farmers to properly keep the biomass residues. It is also necessary to establish a collection system of biomass residues, which is also the first experience of its kind at this scale in the country.

Other barriers

Remark:
In addition to the barriers above, the KOAR project can demonstrate more barriers against its implementation in the absence of CDM, e.g. no experience of developing dedicated plantations of energy crops by farmers, no experience of collecting the biomass residues at this scale in terms of its amount and time span,

Remark:
Project participant is required to:
(a) Identify the most relevant barrier;
(b) Provide transparent and documented third party evidence such as national/international statistics, national/provincial policy and legislation, studies/surveys by independent agencies, etc.

In the case of KOAR project, documented evidence may need to be provided to demonstrate that:
(a) No prior experience of biomass fueled power generation in the country (SENI report?);
(b) No prior experience of using gasifier for tropical grasses;
(c) No prior experience of using biomass residues as energy and/or power resources at this scale.

Step 4. Common practice analysis
Unless the proposed project type has demonstrated to be first-of-its-kind, the additionality tests shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.

In the case of KOAR project, it is not necessary to conduct this analysis since the proposed project is definitely the first-of-its-kind in the country.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA

All the CDM project activity under the proposed PoA is implemented by KOAR, the project proponent. Any activity of similar nature in terms of project design as well as the technology applied will not be included as CPAs unless it is carried out by KOAR.

The criteria and data to be applied for assessing the additionality of each CPA are as follows:

Criteria 1: Investment analysis of alternative scenarios
For all the CPAs, the investment analysis of all alternative scenarios will be made in accordance with the steps described in Step 1 and Step 2 of E.5.1.

Criteria 2: Criteria for the use of biomass resources
For all CPAs, the types of biomass resources used for power generation will be specified. For the biomass from dedicated plantations, the applicability of the baseline and monitoring methodology is tested and documented for each item as described in E5. For each biomass residue to be used, the most plausible and credible baseline will be established in accordance with Step 2-2 of E.5.1 above.

Criteria 3: Testing project design similarity
For all CPAs, the project design similarity will be tested in view of each project component, technology to be applied, biomass resources to be applied, and so forth in accordance with the "Eligibility criteria for inclusion of a SSC-CPA in the PoA" mentioned in A.4.2.2 of this POA-DD.

E.6. Estimation of Emission reductions of a CPA:

E.6.1 Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Baseline emissions are calculated by the equations determined in the AMS-I.D. "Grid connected renewable electricity generation (Version 15)" with the use of the latest approved version of the "Tool to calculate emission factor for an electricity system". For the estimation of the project emissions, in accordance with the guidance given in the AMS-I.D., the approved baseline and monitoring methodology AM0042, "Grid-connected electricity generation using biomass from newly developed dedicated plantations" is used.

E.6.2 Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

1. Baseline emissions
In accordance with the AMS-I.D. "Grid connected renewable electricity generation (Version 15)" with the use of the latest approved version of the "Tool to calculate emission factor for an electricity system", the baseline emissions in a SSC-CPA is calculated by the following equation:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,y} \quad \textbf{(1)}$$

Where:

BE_y	=	Baseline emissions in year y (tCO_2/yr)
$EG_{pj,y}$	=	Net quantity of electricity generated in the project plant in year y (MWh/yr)
$EF_{grid,y}$	=	Grid emission factor in year y, monitored and calculated according to the latest approved version of the "Tool to calculate emission factor for an electricity system" (tCO_2/MWh)

2. Project emissions

In accordance with the with guidance given in the AMS-I.D. and the approved baseline and monitoring methodology AM0042, the total project emissions are given by the equation below:

$$PE_y = PE_{FC,on-site,y} + PE_{EC,y} + PE_{TP,y} + PE_{BF,y} + PE_{FC,PL,y} + PE_{FP,y} + PE_{FA,y} + PE_{BB,y} \quad \textbf{(2)}$$

Where:

PE_y = Project emissions in year *y* (tCO_2/yr)

$PE_{FC,on-site,y}$ = Project emissions in year *y* from co-firing fossil fuels in the project plant and/or from other fossil fuel combustion that occurs at the site of the project plant and that is attributable to the project activity (tCO_2/yr)

$PE_{EC,y}$ = Project emissions from electricity consumption at the site of the project plant that is attributable to the project activity (e.g. for mechanical processing of the biomass) in year *y* (tCO_2/yr)

$PE_{TP,y}$ = Project emissions related to transportation of the biomass from the dedicated project plantation and/or biomass residues to the power plant in year *y* (tCO_2/yr)

$PE_{BF,y}$ = Project emissions from combustion of the renewable biomass from the dedicated project plantation and/or biomass residues in the project plant in year *y* (tCO_2e/yr)

$PE_{FC,PL,y}$ = Project emissions related to fossil fuel consumption at the plantation during agricultural operations in year *y* (tCO_2/yr)

$PE_{,FP,y}$ = Project emissions related to the production of synthetic fertilizer that is used at the dedicated plantation in year *y* (tCO_2e/yr)

$PE_{FA,y}$ = Project emissions related to the application of fertilizers at the plantation in year *y* (tCO_2e/yr)

$PE_{BB,y}$ = Project emissions arising from field burning of biomass at the plantation site (tCO_2e/yr)

(a) CO_2 emissions from fuel combustion ($PE_{FC,on-site,y}$)

This emission source should include CO_2 emissions from all fuel consumption that occurs at the site of the project plant and that is attributable to the project activity. This includes:

- fossil fuels co-fired in the project plant;
- biomass co-fired in the project plant other than the biomass from the dedicated plantation or biomass residues;
- fuel consumption for mechanical preparation or drying of the biomass.

CO_2 emissions from firing biomass from the dedicated plantation and/or biomass residues should not be included. Emissions shall be calculated as follows:

$$PE_{FC,on-site,y} = \sum_i FC_{on-site,i,y} \cdot NCV_i \cdot EF_{CO2,FF,i} \quad \textbf{(3)}$$

Where:

$PE_{FC,on-site,y}$ = Project emissions in year *y* from co-firing fossil fuels in the project plant and/or from other fossil fuel combustion that occurs at the site of the project plant and that is attributable to the project activity (tCO_2/yr)

$FC_{on-site,i,y}$ = Amount fuel type *i* that is (a) co-fired in the project plant and/or is (b) combusted at the site of the project plant and attributable to the project activity, during the year y (mass or volume unit)

NCV_i = Net calorific value of fuel type *i* (G/mass or volume unit)

$EF_{CO2,FF,I}$ = CO_2 emission factor of fuel type *i* (tCO_2/GJ)

i = Fossil fuels or biomass fuel types other than the biomass from the dedicated plantation or biomass residues

(b) CO_2 emissions from on-site electricity consumption ($PE_{EC,y}$)

CO_2 emissions from on-site electricity consumption ($PE_{EC,y}$) are calculated by multiplying the electricity consumption by an appropriate grid emission factor, as follows:

$$PE_{EC,y} = EC_{PJ,y} \cdot EF_{grid,y} \quad \textbf{(4)}$$

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption at the site of the project plant that is attributable to the project activity (e.g. for mechanical processing of the biomass) in year *y* (tCO_2/yr)

$EC_{PJ,y}$ = On-site electricity consumption attributable to the project activity during the year *y* (MWh)

$EF_{grid,y}$ = Grid emission factor in year *y*, monitored and calculated according to the latest approved version of "Tool to calculate emission factor for an electricity system" (tCO_2/MWh)

(c) CO_2 emissions from fossil fuel combustion due to transportation of biomass from their sources(s) of generation to the site of the project plant ($PE_{TP,y}$)

This emission source includes CO_2 emissions from the transportation of biomass from the dedicated plantation site(s) and biomass residues from their source of generation to the project plant. Emissions may be calculated either based on information on the number of trips, the return trip distance and CO_2 emission factors of the vehicles (Option 1) or based on data on the actual fuel consumption of vehicles (Option 2). In the case of the CPA under the proposed PoA, Option 2 is utilized for calculation as shown below.

Option 2:

Emissions are calculated based on the actual quantity of fossil fuels consumed for transportation as shown in the equation below:

$$PE_{TP,y} = \sum_i FC_{TR,i,y} \cdot NCV_i \cdot EF_{CO2,FF,i} \quad \textbf{(5)}$$

Where:

$PE_{TP,y}$ = Project emissions related to transportation of biomass from the dedicated and/or biomass residues from their sources of generation to the power plant in year *y* (tCO_2/yr)

$FC_{TR,i,y}$ = Fuel consumption of fuel type *i* used in trucks for transportation of biomass during the year *y* (mass or volume unit)

NCV_i = Net calorific value of fuel type *i* (GJ/mass or volume unit)

$EF_{CO2,FF,I}$ = CO_2 emission factor for fossil fuel type *i* (tCO_2/GJ)

Where the biomass is obtained from different sources with different distances and/or transported in different types of vehicles, emissions should be calculated separately for the different distances and vehicles types.

(d) CH_4 emissions from combustion of biomass ($PE_{BF,y}$)

CH_4 emissions are associated with the combustion of biomass fired in the project plant. This is calculated as follows:

$$PE_{BF,y} = GWP_{CH4} \cdot \sum_j \left(BF_{pj,j,y} \cdot NCV_j \cdot EF_{CH4,BF,j} \right) \quad \textbf{(6)}$$

Where:

$PE_{BF,y}$ = Project emissions from combustion of the renewable biomass from the dedicated project plantation and biomass residues in the project plant in year *y* (tCO_2e/yr)

GWP_{CH4} = Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)
$BF_{PJ,j,y}$ = Quantity of biomass type *j* fired in the project plant in the year *y* (tons of dry matter or liter)
NCV_j = Net calorific value of biomass fuel type *j* (GJ/ton of dry matter or GJ/liter)
$EF_{CH4,BF,j}$ = CH_4 emission factor for the combustion of biomass type *j* in the project plant (tCH_4/GJ)
j = All types of renewable biomass from the dedicated project plantation and types of biomass residues that are fired in the project plant

To determine the CH_4 emission factor, project participants may conduct measurements at the plant site or use IPCC default values, as provided in Table 2 below. The uncertainty of the CH_4 emission factor in many cases is relatively high. In order to reflect this and for the purpose of providing conservative estimates of emission reductions, a conservativeness factor must be applied to the CH_4 emission factor. The level of the conservativeness factor depends on the uncertainty range of the CH_4 emission factor estimate. Appropriate conservativeness factors from Table 3 below shall be chosen and shall be multiplied with the estimated CH_4 emission factor.

For example, where the default CH_4 emission factor of 30 kg/TJ from Table 2 below is used, for which the uncertainty is estimated to be 300%, and the conservativeness factor for the uncertainty is 1.37 (from Table 3). Thus, in this case a CH_4 emission factor of (30*1.37=) 41.1 kg/TJ should be used.

Table 2. Default CH_4 emission factors for combustion of biomass residues[8]

	Default emission factor (kg CH_4 / TJ)	Assumed uncertainty
Wood waste	30	300%
Sulphite lyes (Black Liquor)	3	300%
Other solid biomass residues	30	300%
Liquid biomass residues	3	300%

Table 3. Conservativeness factors

Estimated uncertainty range (%)	Assigned uncertainty band (%)	Conservativeness factor where higher values are more conservative
Less than or equal to 10	7	1.02
Greater than 10 and less than or equal to 30	20	1.06
Greater than 30 and less than or equal to 50	40	1.12
Greater than 50 and less than or equal to 100	75	1.21
Greater than 100	150	1.37

(e) CO_2 emissions from fossil fuel consumption during agricultural operations ($PE_{FC,PL,y}$)

CO_2 emissions associated with fossil fuel consumption at the plantation are calculated as follows:

$$PE_{FC,PL,y} = \sum_i FC_{PL,i,y} \cdot NCV_i \cdot EF_{CO2,FF,i} \quad \textbf{(7)}$$

Where:
$PE_{FC,PL,y}$ = Project emissions related to fossil fuel consumption at the plantation during agricultural operations in year *y* (tCO_2/yr)
$FC_{PL,i,y}$ = Amount of fuel type *i* that is combusted at the dedicated plantation during the year *y* (mass or volume unit)

NCV_i = Net calorific value of fuel type *i* (GJ/mass or volume unit)
$EF_{CO2,FF,I}$ = CO_2 emission factor of fuel type *i* (tCO_2/GJ)
i = Fuel types used for combustion at the dedicated plantation

f) Emissions from the production of synthetic fertilizer that is used at the plantation ($PE_{FP,y}$)

The GHG emissions from the production of synthetic fertilizer are estimated for each synthetic fertilizer type *f* by multiplying an emission factor with the monitored quantity of fertilizer applied at the plantation during the year *y*, as follows:

$$PE_{FP,y} = \sum_f \left(EF_{CO2e,FP,f} \cdot F_{SF,f,y}\right) \quad \textbf{(8)}$$

Where:
$PE_{FP,y}$ = Project emissions related to the production of synthetic fertilizer that is used at the dedicated plantation in year *y* (tCO_2e/yr)
$EF_{CO2e,FP,f}$ = Emission factor for GHG emissions associated with the production of fertilizer type *f* (tCO_2e/kg fertilizer)
$F_{SF,f,y}$ = Amount of synthetic fertilizer of type *f* applied in year *y* (kg fertilizer/yr)
f = Types of synthetic fertilizers applied at the dedicated plantation

g) N_2O emissions from application of fertilizers at the plantation ($PE_{FA,y}$)

N_2O emissions are associated with the application of both organic and synthetic fertilizers, and are emitted through direct soil emissions and indirect emissions from atmospheric deposition and leaching and run-off. Emissions are calculated as follows.

$$PE_{FA,y} = GWP_{N2O} \cdot \frac{44}{28} \cdot \left(PE_{N2O-N,dir,y} + PE_{N2O-N,ind,y}\right) \quad \textbf{(9)}$$

Where:
$PE_{FA,y}$ = Project emissions related to the application of fertilizers at the dedicated plantation in year *y* (tCO_2e/yr)
GWP_{N2O} = Global Warming Potential of nitrous oxide valid for the commitment period (tCO_2e/tN_2O)
$PE_{N2O-N,dir,y}$ = Direct N_2O-N emissions as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)
$PE_{N2O-N,ind,y}$ = Indirect N_2O-N emissions as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

Direct soil N_2O emissions

$$PE_{N2O-N,dir,y} = EF_{N2O-N,dir} \cdot \left(F_{ON,y} + F_{SN,y}\right) \quad \textbf{(10)}$$

Where:
$PE_{N2O-N,dir,y}$ = Direct N_2O-N emissions as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)
$EF_{N2O-N,dir}$ = Emission factor for direct nitrous oxide emissions from N inputs (kg N_2O-N/kg N)
$F_{ON,y}$ = Amount of organic fertilizer nitrogen from animal manure, sewage, compost or other organic amendments applied at the dedicated plantation during the year *y* (t N/yr)
$F_{SN,y}$ = Amount of synthetic fertilizer nitrogen applied at the dedicated plantation during the year *y* (t N/yr)

Indirect N_2O emissions

Note: This source of emission is not to be accounted for in the case of a woody plantation.

Indirect N_2O emissions comprise N_2O emissions due to atmospheric decomposition of N volatilized from the plantation and N_2O emissions from leaching/run-off:

$$PE_{N2O-N,ind,y} = PE_{N2O-N,ind,ATD,y} + PE_{N2O-N,ind,L,y} \quad \textbf{(11)}$$

Where:

$PE_{N2O-N,ind,y}$ = Indirect N_2O-N emissions as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

$PE_{N2O-N,ind,ATD,y}$ = Indirect N_2O-N emissions due to atmospheric deposition of volatilized N, as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

$PE_{N2O-N,ind,L,y}$ = Indirect N_2O-N emissions due to leaching/run-off, as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

Indirect N_2O emissions due to atmospheric decomposition are calculated as follows:

$$PE_{N2O-N,ind,ATD,y} = (F_{SN,y} \cdot Frac_{GASF} + F_{ON,y} \cdot Frac_{GASM}) \cdot EF_{N2O-N,ATD} \quad \textbf{(12)}$$

Where:

$PE_{N2O-N,ind,ATD,y}$ = Indirect N_2O-N emissions due to atmospheric deposition of volatilized N, as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

$F_{SN,y}$ = Amount of synthetic fertilizer nitrogen applied at the dedicated plantation during the year *y* (t N/yr)

$Frac_{GASF}$ = Fraction of synthetic fertilizer N that volatilizes as NH_3 and NO_X (kg N volatilized/kg N applied)

$F_{ON,y}$ = Amount of organic fertilizer nitrogen from animal manure, sewage, compost or other organic amendments applied at the dedicated plantation during the year *y* (t N/yr)

$Frac_{GASM}$ = Fraction of organic N fertilizer that volatilizes as NH_3 and NO_X (kg N volatilized/kg N applied)

$EF_{N2O-N,ATD}$ = Emission factor for atmospheric deposition of N on soils and water surfaces (tN_2O-N/t N volatilized)

Indirect N_2O emissions due to leaching and runoff are calculated as follows:

$$PE_{N2O-N,ind,L,y} = (F_{SN,y} + F_{ON,y}) \cdot Frac_{LEACH} \cdot EF_{N2O-N,L} \quad \textbf{(13)}$$

Where:

$PE_{N2O-N,ind,L,y}$ = Indirect N_2O-N emissions due to leaching/run-off, as a result of nitrogen application at the dedicated plantation during the year *y* (tN_2O-N/yr)

$F_{SN,y}$ = Amount of synthetic fertilizer nitrogen applied at the dedicated plantation during the year *y* (t N/yr)

$F_{ON,y}$ = Amount of organic fertilizer nitrogen from animal manure, sewage, compost or other organic amendments applied at the dedicated plantation during the year *y* (t N/yr)

$Frac_{LEACH}$ = Fraction of synthetic and organic fertilizer N that is lost through leaching and runoff (kg N leached and runoff/kg N applied)

$EF_{N2O-N,L}$ = Emission factor for N2O emissions from N leaching and runoff (t N_2O-N/t N leached and runoff)

h) CH_4 and N_2O emissions from the field burning of biomass

Biomass may be burnt at the start of the project activity (for land clearance) or regularly during the crediting period (e.g. after harvest). In these cases, CH_4 and N_2O emissions should be calculated for each time that field burning is occurring, as follows:

$$PE_{BB,y} = A_B \cdot M_B \cdot C_f \cdot \left(EF_{N2O,BB} \cdot GWP_{N2O} + EF_{CH4,BB} \cdot GWP_{CH4}\right) \quad \textbf{(14)}$$

Where:

$PE_{BB,y}$	=	Project emissions arising from field burning of biomass at the plantation site (tCO_2e/yr)
A_B	=	Area burned (ha)
M_B	=	Average mass of biomass available for burning on the area (t dry matter/ha)
C_f	=	Combustion factor, accounting for the proportion of fuel that is actually burnt (dimensionless)
$EF_{N2O,BB}$	=	N_2O emission factor for field burning of biomass (tN_2O/tonne of dry matter)
GWP_{N2O}	=	Global Warming Potential of nitrous oxide valid for the commitment period (tCO_2e/tN_2O)
$EF_{CH4,BB}$	=	CH_4 emission factor for field burning of biomass (tCH_4/tonne of dry matter)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

3. Leakage

An important potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass ***residues*** from other uses to the project plant as a result of the project activity.

If biomass residues are co-fired in the project plant, project participants shall demonstrate that the use of the biomass residues does not result in increased use of fossil fuels or other GHG emissions elsewhere. For this purpose, project participants shall assess as part of the monitoring the supply situation for each type of biomass residue *k* used in the project plant. Table 6 below outlines the options that may be used to demonstrate that the biomass residues used in the plant did not increase fossil fuel consumption or other GHG emissions elsewhere.

Which approach should be used depends on the most plausible baseline scenario for the use of the biomass residues. Where scenarios B1, B2 or B3 apply, use approaches L_1, L_2 and/or L_3. Where scenario B4 applies, use approaches L_2 or L_3. Where scenario B5 applies, use approach L_4.

Table . Approaches to rule out leakage

L_1	Demonstrate that at the sites where the project activity is supplied from with biomass residues, the biomass residues have not been collected or utilized (e.g. as fuel, fertilizer or feedstock) but have been dumped and left to decay, land-filled or burnt without energy generation (e.g. field burning) prior to the implementation of the project activity. Demonstrate that this practice would continue in the absence of the CDM project activity, e.g. by showing that in the monitored period no market has emerged for the biomass residues considered or by showing that it would still not be feasible to utilize the biomass residues for any purposes (e.g. due to the remote location where the biomass residue is generated).
L_2	Demonstrate that there is an abundant surplus of the in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of available biomass residues of type *k* in the region is at least 25% larger than the quantity of biomass residues of type *k* that are utilized (e.g. for energy generation or as feedstock), including the project plant.
L_3	Demonstrate that suppliers of the type of biomass residue in the region of the project

	activity are not able to sell all of their biomass residues. For this purpose, project participants shall demonstrate that the ultimate supplier of the biomass residue (who supplies the project) and a representative sample of suppliers of the same type of biomass residue in the region had a surplus of biomass residues (e.g. at the end of the period during which biomass residues are sold), which they could not sell and which are not utilized.
L_4	Identify the consumer that would use the biomass residue in the absence of the project activity (e.g. the former consumer). Demonstrate that this consumer has substituted the biomass residue diverted to the project with other types of biomass residues (and not with fossil fuels or other types of biomass than biomass residues[9]) by showing that the former user only fires biomass residues for which leakage can be ruled out using approaches L_2 or L_3. Provide credible evidence and document the types and amounts of biomass residues used by the former user as replacement for the biomass residue fired in the project activity and apply approaches L_2 or L_3 to these types of biomass residues. Demonstrate that the substitution of the biomass residues used in the project activity with other types of biomass residues does not require a significant additional energy input except for the transportation of the biomass residues.

Where project participants wish to use approaches L_2, L_3 or L_4 to assess leakage effects, they shall clearly define the geographical boundary of the region and document it in the draft CDM-PDD. In defining the geographical boundary of the region, project participants should take the usual distances for biomass transports into account, i.e. if biomass residues are transported up to 50 km, the region may cover a radius of 50 km around the project activity. In any case, the region should cover a radius around the project activity of at least 20 km but not more than 200 km. Once defined, the region should not be changed during the crediting period(s).

Project participants shall apply a leakage penalty to the quantity of biomass residues, for which project participants cannot demonstrate with one of the approaches above that the use of the biomass residue does not result in leakage. The leakage penalty aims at adjusting emission reductions for leakage effects in a conservative manner, assuming that this quantity of biomass residues is substituted by the most carbon intensive fuel in the country.

If for a certain biomass residue type *k* used in the project leakage effects cannot be ruled out with one of the approaches above, leakage effects for the year *y* shall be calculated as follows:

$$LE_y = EF_{CO2,LE} \cdot \sum_n BF_{LE,n,y} \cdot NCV_n \quad \textbf{(15)}$$

Where:

LE_y = Leakage emissions during the year *y* (tCO_2/yr)

$EF_{CO2,LE}$ = CO_2 emission factor of the most carbon intensive fuel used in the country (tCO_2/GJ)

$BF_{LE,n,y}$ = Quantity of biomass residue type n used for heat generation as a result of the project activity during the year *y* and for which leakage cannot be ruled out using one of the approaches L1, L2, L3 or L4 (tons of dry matter or liter)

NCV_n = Net calorific value of the biomass residue type *n* (GJ/ton of dry matter or GJ/liter)

n = Biomass residue type *n* for which leakage cannot be ruled out using one of the approaches L1, L2, L3 or L4

In case of approaches L_1, $BF_{LE,n,y}$ corresponds to the quantity of biomass residue type *n* that is obtained from the relevant source or sources.

In case of approaches L_2 or L_3, $BF_{LE,n,y}$ corresponds to the quantity of biomass residue type k used in the project plant as a result of the project activity during the year y ($BF_{LE,n,y} = BF_{PJ,k,y}$, where $n=k$).

In case of approach L_4, ($BF_{LE,n,y} \cdot NCV_n$) corresponds to the lower value of

(a) The quantity of fuel types m, expressed in energy quantities, that are used by the former user of the biomass residue type k and for which leakage can not be ruled out because the fuels used are either (i) fuels types other than biomass residues (e.g. fossil fuels or biomass types other than biomass residues) or (ii) are biomass residues but leakage can not be ruled out for those types of biomass residues with approaches L_2 or L_3; as follows:

$$BF_{LE,n,y} \cdot NCV_n = \sum_m FC_{former\ user,m,y} \cdot NCV_m \quad \textbf{(16)}$$

Where:

$BF_{LE,n,y}$	=	Quantity of biomass residue type n used for heat generation as a result of theproject activity during the year y and for which leakage cannot be ruled out using approach L4 (tons of dry matter or liter)
NCV_n	=	Net calorific value of the biomass residue type n (GJ/ton of dry matter or GJ/liter)
n	=	Biomass residue type n for which leakage cannot be ruled out using approach L4
$FC_{former\ user,m,y}$	=	Quantity of fuel type m used by the former user of the biomass residue type n during the year y (mass or volume unit)
NCV_m	=	Net calorific value of fuel type m (GJ/ton of dry matter or GJ/liter)
m	=	Fuel type m, being either (i) a fuel type other than a biomass residue (e.g. fossil fuel or biomass other than biomass residues) or (ii) a biomass residues for which leakage can not be ruled out with approaches L_2 or L_3

(b) The quantity of biomass residue type k, expressed in energy quantities, used in the project plant during the year y ($BF_{LE,n,y} = BF_{PJ,k,y,}$ where $n=k$).

4. Emission reductions

The emission reductions (ER_y) are calculated as

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(17)}$$

Where:

ER_y	=	Emission reductions in year y (tCO_2/yr)
BE_y	=	Baseline emissions in year y (tCO_2/yr)
PE_y	=	Project emissions in year y (tCO_2/yr)
LE_y	=	Leakage emissions in year y (tCO_2/yr)

5. Changes required for methodology implementation in 2nd and 3rd crediting periods

Consistent with guidance by the Executive Board, project participants shall assess the continued validity of the baseline and update the baseline.

In order to assess the continued validity of the baseline, project participants should apply the procedure to determine the most plausible baseline scenario, as outlined above. The crediting period may only be renewed if the application of the procedure results in that the baseline scenarios for power generation and, if applicable, the use of biomass residues, as determined in the draft CDM-PDD, still apply.

The following data shall be updated at the renewal of the crediting period, based on any future revision or amendment of the 2006 IPCC Guidelines:

- Emissions factor for direct N_2O emissions from N inputs ($EF_{N2O-N,dir}$)
- Emissions factor for atmospheric deposition of N on soils and water surfaces ($EF_{N2O,ATD}$)
- Emissions factor for N_2O emissions from N leaching and runoff ($EF_{N2O-N,L}$)
- Fraction of organic N fertilizer that volatilizes as NH_3 and NO_X ($Frac_{GASM}$)
- Fraction of synthetic and organic fertilizer N that is lost through leaching and runoff ($Frac_{LEACH}$)
- Fraction of synthetic fertilizer N that volatilizes as NH_3 and NO_X ($Frac_{GASF}$)
- N_2O emission factor for field burning of biomass ($EF_{N2O,BB}$)
- CH_4 emission factor for field burning of biomass ($EF_{CH4,BB}$)

Data and parameters not monitored

Parameter:	**$EF_{N2O-N,dir}$**
Data unit:	kg N_2O-N / kg N input
Description:	Emissions factor for direct N_2O emissions from N inputs
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.1
Value to be applied:	0.01
Any comment:	

Parameter:	**$EF_{N2O,ATD}$**
Data unit:	t N_2O-N / t N volatilized
Description:	Emissions factor for atmospheric deposition of N on soils and water surfaces
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.3
Value to be applied:	0.01
Any comment:	

Parameter:	**$EF_{N2O-N,L}$**
Data unit:	t N_2O-N / t N leached and runoff
Description:	Emissions factor for N_2O emissions from N leaching and runoff
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.3
Value to be applied:	0.0075
Any comment:	

Parameter:	**$Frac_{GASM}$**
Data unit:	kg N volatilized / kg N applied
Description:	Fraction of organic N fertilizer that volatilizes as NH_3 and NO_X
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.3
Value to be applied:	0.2
Any comment:	

Parameter:	**$Frac_{LEACH}$**
Data unit:	kg N leached and runoff / kg N applied
Description:	Fraction of synthetic and organic fertilizer N that is lost through leaching and runoff
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.3
Value to be applied:	0.3

Any comment:	

Parameter:	**$Frac_{GASF}$**
Data unit:	kg N volatilized / kg N applied
Description:	Fraction of synthetic fertilizer N that volatilizes as NH_3 and NO_X
Source of data:	2006 IPCC Guidelines, Vol. 4, Ch. 11. Table 11.3
Value to be applied:	0.1
Any comment:	

Parameter:	**$EF_{N2O,BB}$**
Data unit:	t N_2O / ton of dry matter of biomass
Description:	N_2O emission factor for field burning of biomass
Source of data:	Select the most suitable value to the type of biomass from the 2006 IPCC Guidelines, Vol. 4, Ch. 2, Table 2.5
Measurement procedures (if any):	**To be filled by the project proponent**
Any comment:	

Parameter:	**$EF_{CH4,BB}$**
Data unit:	t CH_4 / ton of dry matter of biomass
Description:	CH_4 emission factor for field burning of biomass
Source of data:	Select the most suitable value to the type of biomass from the 2006 IPCC Guidelines, Vol. 4, Ch. 2, Table 2.5
Measurement procedures (if any):	**To be filled by the project proponent**
Any comment:	

E.6.3 Data and parameters that are to be reported in CDM SSC-CPA-DD form:

To be described by the project proponent

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**$EG_{PJ,y}$**
Data unit:	MWh/yr
Description:	Net quantity of electricity generated in the project plant in year *y*
Source of data:	Electricity meter
Measurement procedures (if any):	
Monitoring frequency:	Continuous
QA/QC procedures:	Metered net electricity generation should be cross-checked with receipts from sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the energy quantity of all fuels fired results in a reasonable efficiency that is comparable to previous years).
Any comment:	

Data / Parameter:	**$EF_{grid,y}$**
Data unit:	tCO_2/MWh
Description:	Grid electricity emissions factor
Source of data:	As per the latest approved version of "Tool to calculate emission factor for an electricity system"
Measurement procedures (if any):	
Monitoring frequency:	Either once at the start of the project activity or updated annually, consistent with guidance in "Tool to calculate emission factor for an electricity system"
QA/QC procedures:	Apply procedures in "Tool to calculate emission factor for an electricity system"
Any comment:	All data and parameters to determine the grid electricity emission factor, as required by "Tool to calculate emission factor for an electricity system", shall be included in the monitoring plan.

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	tCO_2/GJ
Description:	Carbon dioxide emissions factor of fuel type *i*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice.
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards.
Monitoring frequency:	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually.
QA/QC procedures:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, collect additional information or conduct additional measurements.
Any comment:	

Data / Parameter:	**$BF_{PJ,j,y}$**
Data unit:	tons of dry matter or liter
Description:	Quantity of biomass type *j* fired in the project plant in the year *y* (tons of dry matter or liter)
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be crosschecked with the quantity of electricity generated and any fuel purchase receipts (if available).
Monitoring frequency:	Continuously, aggregated at least annually
QA/QC procedures:	Cross-check the measurements by establishing an annual energy balance that is based on purchased quantities and stock changes. Also cross check with fuel purchase receipts and the quantity of electricity generation.
Any comment:	The quantity of biomass combusted should be collected separately for all types of biomass.

Data / Parameter:	**Moisture content of the biomass**
Data unit:	% Water content
Description:	Moisture content of each biomass type *j*
Source of data:	On-site measurements
Measurement procedures (if any):	
Monitoring frequency:	Continuously, mean values calculated at least annually
QA/QC procedures:	
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary.

Data / Parameter:	**NCV_i, NCV_j**
Data unit:	GJ / mass or volume unit (use a dry matter basis for biomass)
Description:	Net calorific value of fuel type *i* or *j*
Source of data:	Biomass: Measurements Fossil fuels: Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice.
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV of biomass based on the dry matter.
Monitoring frequency:	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually.
QA/QC procedures:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements.
Any comment:	

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	tCO_2/yr
Description:	On-site electricity consumption attributable to the project activity during the year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Electricity meters
Monitoring frequency:	Continuously, aggregated at least annually
QA/QC procedures:	Cross-check measurement results with invoices for purchased electricity if available.
Any comment:	

Data / Parameter:	**$FC_{on\text{-}site,i,y}$**
Data unit:	mass or volume unit
Description:	Amount fuel type *i* that is (a) co-fired in the project plant and/or is (b) combusted at the site of the project plant and attributable to the project activity, during the year *y*
Source of data:	Measurements

Measurement procedures (if any):	
Monitoring frequency:	Continuous
QA/QC procedures:	Metered fuel consumption quantities should be cross-checked with fuel purchase Receipts
Any comment:	

Data / Parameter:	$\mathbf{N_y}$
Data unit:	-
Description:	Number of truck trips during the year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency:	Continuously
QA/QC procedures:	Check consistency of the number of truck trips with the quantity of biomass combusted.
Any comment:	Project participants have to monitor either this parameter or the average truck load TL_y.

Data / Parameter:	$\mathbf{AVD_y}$
Data unit:	Km
Description:	Average return trip distance (from and to) between the source of the biomass and the site of the project plant during the year *y*
Source of data:	Records by project participants on the origin of the biomass
Measurement procedures (if any):	
Monitoring frequency:	Regularly
QA/QC procedures:	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps).
Any comment:	If biomass is supplied from different sites, this parameter should correspond to the mean value of km traveled by trucks that supply the biomass plant.

Data / Parameter:	$\mathbf{EF_{km,CO2,y}}$
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor per km for the trucks during the year *y*
Source of data:	Conduct sample measurements of the fuel type, fuel consumption and distance traveled for all truck types. Calculate CO_2 emissions from fuel consumption by multiplying with appropriate net calorific values and CO_2 emission factors. For net calorific values and CO_2 emission factors, use reliable national default values or, if not available, (country-specific) IPCC default values. Alternatively, choose emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range).
Measurement procedures (if any):	
Monitoring frequency:	At least annually
QA/QC procedures:	Cross-check measurement results with emission factors referred to in the literature.

Any comment:	

Data / Parameter:	**TL_y**
Data unit:	tons or liter (consistent with the unit chosen for the biomass)
Description:	Average truck load of the trucks used
Source of data:	On-site measurements
Measurement procedures (if any):	Determined by averaging the weights of each truck carrying biomass to the project plant
Monitoring frequency:	Continuously, aggregated annually
QA/QC procedures:	-
Any comment:	Project participants have to monitor either the number of truck trips N_y or this parameter.

Data / Parameter:	**$FC_{TR,i,y}$**
Data unit:	Mass or volume unit
Description:	Fuel consumption of fuel type *i* used in trucks for transportation of biomass during the year *y*
Source of data:	Fuel purchase receipts or fuel consumptions meters in the trucks
Measurement procedures (if any):	
Monitoring frequency:	Continuously, aggregated annually
QA/QC procedures:	Cross-check the resulting CO_2 emissions for plausibility with a simple calculation based on the distance approach (option 1).
Any comment:	This parameter only needs to be monitored if option 2 is chosen to estimate CO_2 emissions from transportation.

Data / Parameter:	**$EF_{CH4,BF,j}$**
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for the combustion of biomass type *j* in the project plant
Source of data:	On-site measurements or default values, as provided in Table 2.
Measurement procedures (if any):	The CH_4 emission factor may be determined based on a stack gas analysis using calibrated analyzers.
Monitoring frequency:	At least quarterly, taking at least three samples per measurement
QA/QC procedures:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements.
Any comment:	Note that a conservative factor shall be applied, as specified in the baseline methodology.

Data / Parameter:	**$FC_{PL,i,y}$**
Data unit:	Mass or volume unit
Description:	Amount of fuel type *i* that is combusted at the dedicated plantation during the year *y*
Source of data:	Measurements
Measurement procedures (if any):	

Monitoring frequency:	Continuously
QA/QC procedures:	Metered fuel consumption quantities should be cross-checked with purchase receipts.
Any comment:	

Data / Parameter:	**$F_{SF,f,y}$**
Data unit:	kg fertilizer/year
Description:	Amount of synthetic fertilizer of type *f* applied in year *y*
Source of data:	On-site records by project participants
Measurement procedures (if any):	
Monitoring frequency:	Continuously
QA/QC procedures:	Cross-check records of applied quantities with purchase receipts
Any comment:	

Data / Parameter:	**$EF_{CO2e,FP,f}$**
Data unit:	tCO_2e/kg fertilizer
Description:	Emissions factor for GHG emissions associated with the production of fertilizer type *f*
Source of data:	Select values from Wood and Cowie (2004) and/or other more recent peerreviewed publications that have at least the same scope in a conservative manner (i.e. use the highest value presented for the type of fertilizer). Document the choice.
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	**$F_{ON,y}$**
Data unit:	tons of nitrogen per year
Description:	Amount of organic fertilizer nitrogen from animal manure, sewage, compost or other organic amendments applied at the dedicated plantation during the year *y*
Source of data:	On-site records and measurements
Measurement procedures (if any):	Where applicable, measure the quantities and nitrogen content of any animal manure, sewage, compost or other organic amendments applied as fertilizers to the dedicated plantation.
Monitoring frequency:	Quantities of organic fertilizer: Continuously Nitrogen content: Regularly by sample measurements
QA/QC procedures:	
Any comment:	

Data / Parameter:	**$F_{SN,y}$**
Data unit:	tons of nitrogen per year
Description:	Amount of synthetic fertilizer nitrogen applied at the dedicated plantation during the year *y*
Source of data:	Determine $F_{SN,y}$ based on the types and quantities of fertilizers applied ($F_{SF,f,y}$) and manufacturers information on the nitrogen content of each fertilizer

Measurement procedures (if any):	-
Monitoring frequency:	Continuously
QA/QC procedures:	
Any comment:	

Data / Parameter:	**A_B**
Data unit:	Hectares
Description:	Area burnt
Source of data:	Records by project participants
Measurement procedures (if any):	
Monitoring frequency:	Each time field burning takes place
QA/QC procedures:	
Any comment:	

Data / Parameter:	**M_B**
Data unit:	ton dry matter per hectare
Description:	Average mass of biomass available for burning on the area
Source of data:	Sample measurements by project participants
Measurement procedures (if any):	
Monitoring frequency:	Each time field burning takes place
QA/QC procedures:	
Any comment:	

Data / Parameter:	**C_f**
Data unit:	-
Description:	Combustion factor, accounting for the proportion of fuel that is actually burnt
Source of data:	Sample measurements by project participants or assume a default value of 1
Measurement procedures (if any):	Measure the remaining biomass after field burning.
Monitoring frequency:	Each time field burning takes place
QA/QC procedures:	
Any comment:	

Data / Parameter:	**$EF_{CO2,LE}$**
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of the most carbon intensive fuel used in the country
Source of data:	Identify the most carbon intensive fuel type from the national communication, other literature sources (e.g. IEA). Possibly consult with the national agency responsible for the national communication / GHG inventory. If available, use national default values for the CO_2 emission factor. Otherwise, IPCC default values may be used.
Measurement procedures (if any):	

Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	-
Data unit:	-
Description:	Demonstration that the biomass residue type k from a specific source would continue not to be collected or utilized, e.g. by an assessment whether a market has emerged for that type of biomass residue (if yes, leakage is assumed not be ruled out) or by showing that it would still not be feasible to utilize the biomass residues for any purposes.
Source of data:	Information from the site where the biomass is generated
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	Monitoring of this parameter is applicable if approach L_1 is used to rule out leakage

Data / Parameter:	-
Data unit:	Tons
Description:	Quantity of biomass residues of type *k* or *m* that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Source of data:	Surveys or statistics
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	Monitoring of this parameter is applicable if approach L_2 is used to rule out leakage or if approach L_4 is used in combination with approach L_2 to rule out leakage for the substituted biomass residue type *m*

Data / Parameter:	-
Data unit:	Tons
Description:	Quantity of available biomass residues of type *k* or *m* in the region
Source of data:	Surveys or statistics
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	Monitoring of this parameter is applicable if approach L_2 is used to rule out leakage or if approach L_4 is used in combination with approach L_2 to rule out leakage for the substituted biomass residue type *m*

Data / Parameter:	-
Data unit:	
Description:	Availability of a surplus of biomass residue type *k* or *m* (which cannot be sold or utilized) at the ultimate supplier to the project (or, in case of L_4, the former user of the biomass residue type *k*) and a representative

	sample of other suppliers in the defined geographical region.
Source of data:	Surveys
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	Monitoring of this parameter is applicable if approach L_3 is used to rule out leakage or if approach L_4 is used in combination with approach L_3 to rule out leakage for the substituted biomass residue type *m*

E.7.2. Description of the monitoring plan for a SSC-CPA:

To be described by the project proponent

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

To be described by the project proponent

Model PDD 2

Programmatic CDM for mini-hydropower generation (PoA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small-scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

"Programmatic CDM for Mini-Hydropower Generation in the Dominican Republic"
Version 1
dd/mm/2010

A.2. Description of the small-scale programme of activities (PoA):

The Government of Dominican Republic has set the following target for sustainable development of the country.

- 25% of the total energy needs to be supplied by renewable energy by 2025, and
- at least 10% of the energy purchased by the distribution companies to be supplied by renewable energy sources by 2015

The "Mini-Hydropower Generation Programme CDM in the Dominican Republic" (hereafter, the "Project") is to generate renewable energy by mini-hydropower generation facilities placed in (the natural rivers and/or canals) *[#Please select suitable expression for the proposed programme]* in the Dominican Republic to achiever the above mentioned Government target through programmatic CDM framework. The assumed size of the hydropower generation facilities to be installed by the CPAs under this PoA is between xx~xx *[#Please fill in the blanks with suitable figures that should not be more than "15" considering the potential size of mini-hydropower generation facilities in the country. If there is no particular survey determining the size, please put "15".]*MW and the maximum electricity generation volume is less than or equal to 15MW. At least xx locations, generating approximately xxMW of electricity are identified in the Dominican Republic as potential mini-hydropower generation sites that are yet to be developed.

1. General operating and implementing framework of PoA

The coordinating/managing entity of this Project is the XXX, which is XXX*[#Please describe the organization]*. This Project is a voluntary project implemented by the XXX*[#name of the organization taking role as CME]*.

2. Policy/measure or stated goal of the PoA

The goals of the PoA are to achieve the following national strategy and public interest objectives stated in the "Incentive to Renewable Energy and Special Regimes (Law 57-07)" by promoting establishment of mini-hydropower generation systems throughout the country:

a) To increase the energy diversity and the self-sufficiency of the country;
b) To reduce dependency on imported fossil fuel;
c) To stimulate private investment projects in renewable energy sources;
d) To mitigate the negative environmental impacts of the energy operations with fossil fuel;
e) To favour community social investment in renewable energy projects;
f) To contribute to the decentralization the production of the electrical energy to increase competition among different energy supplies; and

g) To contribute to the attainment of the goals of the National Energy Plan (NEP), specifically with regards to renewable energy sources.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

The implementation of mini-hydropower generation projects is a voluntary action that is not required by law in the Dominican Republic. Within the "Incentive to Renewable Energy and Special Regimes (Law 57-07)", the Dominican Government has increased the incentives for promoting renewable energy including mini-hydropower generation projects. However neither the National Government nor the Provincial Governments mandate any quantitative targets for the installation of mini-hydropower generation facilities under this law.

4. Contribution to Sustainable Development

The Project is designed to "co-benefit" both the global environmental aim to reduce greenhouse gas emissions, as well as the mitigation of local environmental problems including air pollution. Promoting the implementation of this Project will contribute to sustainable development in the Dominican Republic by bringing about the following economic, social and environmental benefits:

Economic/Social Benefits

- Decrease of dependency on imported fossil fuel and increase the energy security of the country: The Dominican Republic is heavily depending on imported fuel and the Government decided to promote renewable energy to increase energy self-sufficiency and diversity of the energy sources of the country.
- Sustainable hydropower development: Because of the small-scale, simple hydropower system, the investment cost for the Project implementation is low. Power producers can utilize the revenues generated through electricity generation and CER sales to further develop hydro energy that meets the financial and social needs of the local communities. This will lead to the socioeconomic development of agricultural communities throughout the Dominican Republic.
- Enhancement of private investments including foreign investment to the local economy: Investment by private companies including foreign investment for the implementation of the Project will contribute to the local economy.
- Creation of job opportunities: New jobs may be created by this Project in the fields of operation and maintenance of the power generation facilities.

Environmental Benefits

- Reduction of greenhouse gas emissions
- Generation of renewable energy without new development of natural landscapes: No new natural land needs to be developed because the mini-hydropower system will utilize the existing irrigation canals. *[#applicable to only the case of canal/irrigation system mini-hydropower generation system]*
- Emissions Reduction of air pollutants (SOx, Nox): SOx, NOx emission will be reduced through replacing conventional grid electricity, most of which are generated through burning of fossil fuel, with hydro electricity.
- Reduction of improper waste accumulation in irrigation system and canals: Hydropower system will require periodic removal of waste to avoid waste materials from disrupting the power generator. *[#applicable to only the case of irrigation system/canal mini-hydropower generation system to be applied]*

A.3. Coordinating/managing entity and participants of SSC-POA:

1. Coordinating or managing entity of the PoA as the entity which communicates with the Board

   XXX *[#name of the organization taking role of CME]*

2. Project participants being registered in relation to the PoA

Table 1. Project Participants

Name of Party Involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of the Dominican Republic	XXX	No
XXX *[#Government of investing country]*	XXX	No

A.4. Technical description of the small-scale _ programme of _ activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

The Dominican Republic

A.4.1.2. Physical/ Geographical boundary:

The boundary of the PoA is defined within the Dominican Republic, which is one of the Caribbean countries. The Dominican Republic is the second largest Caribbean nation, with 48,442 km^2 and an estimated 10 million people.

Map

Figure 1. Location of the Dominican Republic

A.4.2. Description of a typical small-scale _ CDM programme _ activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

Technologies applied in the CPAs under this PoA includes:

- Power generation technology at unutilised water drops in (natural rivers, canals and existing irrigation systems) *[#please select]*; and
- A system to feed generated electricity into the local grid via nearby substations.

As indicated in A.4.2.2, the maximum electricity generation volume is less than or equal to 15MW. The technology that is applied in this Project is the XXX*[#name of the technology if only particular technology is applicable to the PoA]*.

Figure

[#Image of the technology applicable to the PoA]

Figure 2. Images of Mini-Hydropower Generation Facility of PoA

The XXX shown in the Figure2 is the only technology applicable to the PoA. Below are the technological characteristics of the XXX.

(i) It does not require a building to situate the electricity generating facilities because it will be placed in water
(ii) Installation space is small and therefore its instalment does not require significant alteration of landscape
(iii) It can generate electricity from extra small canal drops (approx. 2.5m)
(iv) It does not cause noise pollution (noise level is very small) because it is operated within water
(v) ....

[#please list up the characteristics of the applied technology]

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

The Project defines the following criteria for inclusion of a project activity as a CPA under the PoA.

- A mini-hydropower generation project that newly installs a mini-hydropower generation facility at (natural rivers and/or canals)*[#please select]*
- The technology to be applied must be the XXX (description of the technology) *[#If only particular technology is applicable to this PoA]*
- Located within the Dominican Republic
- Maximum electricity generation volume less than or equal to 15MW
- A renewable energy facility that supplies electricity to, and/or displace electricity from, an electricity distribution system that is (or would have been) supplied by at least one fossil fuel fired generating unit.
- Monitors and collects appropriate data on the parameters listed in A.4.4.2

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

The proposed PoA is a voluntary coordinated action as explained in A.2 (section 3).

The Dominican Government promotes to develop and implement renewable energy including mini-hydropower generation activities through "Incentive to Renewable Energy and Special Regimes (Law 57-07)". The Government has set a target to increase renewable energy utilization ratio upto:

- 25% of the total energy needs by 2025, and
- 10% of the energy purchased by the distribution companies by 2015.

Despite of the above renewable energy policies, there are very few mini-hydropower generation plants in the country due to the barriers, as indicated in E.5.1. Furthermore, the government legislations indicated above do not mandate hydropower generations to be implemented, therefore providing no legal incentives to overcome the economic and technological challenges of hydropower generation. For these reasons, mini-hydropower generation is unlikely to occur in the absence of the registered PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The following operational and management arrangements will be implemented by the coordinating/managing entity for the implementation of the PoA:

(i) A record keeping system for each CPA under PoA
Regular monitoring and recording of specific parameters are carried out by individual CPAs. Data will be recorded digitally. The XXX is responsible for collecting, storing and analyzing data from all CPAs where they will closely monitor the progress of each CPAs as well as provide necessary assistance.

The following figure describes the general layout of the record keeping system.

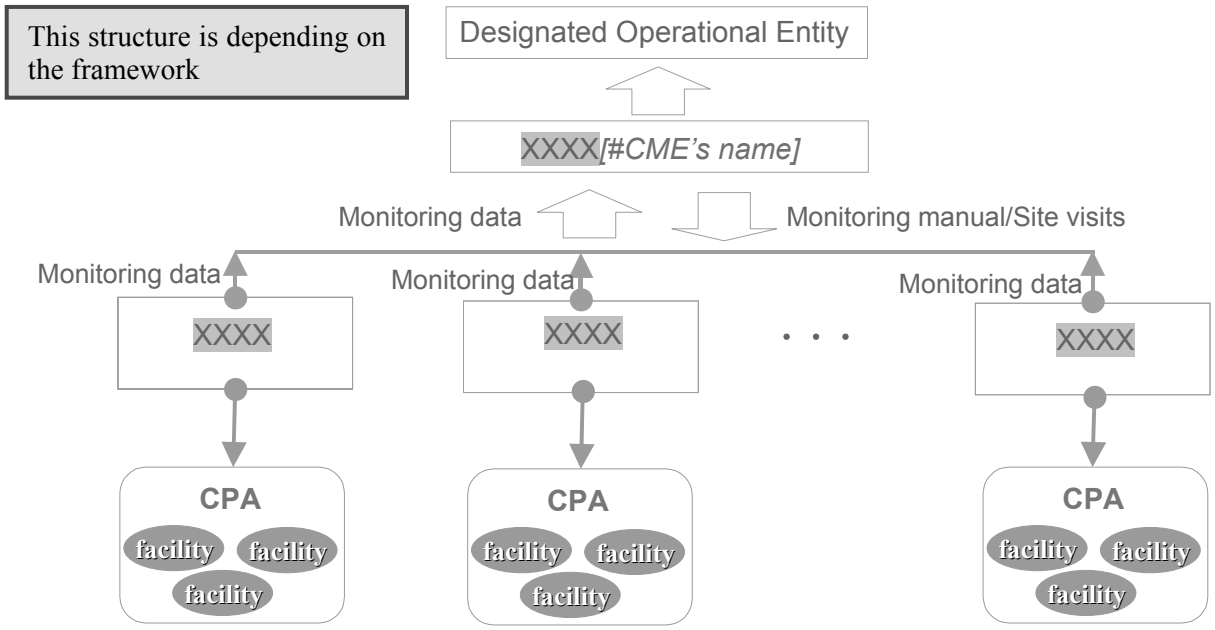


Figure4. Layout of Record Keeping System

(ii) A system/procedure to avoid double counting
An identification system is implemented where numbers will be assigned to a XXX as an owner of a CPA based on the information of their geographic location. These CPA identification numbers are managed by the XXX who will be responsible for closely monitoring individual CPAs to prevent double counting.

(iii) Verification that SSC-CPA is not a debunlded component of another CPA
Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities defines that a registered SSC-CPA shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;

- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

If the CPA is managed by project participants that are only taking part in one CPA, it can be inferred that the CPA does not have the same project participants with any other CPAs (first criteria), thus verifying that the CPA is not a debulded component of another CPA.

If the CPA is managed by project participants that are taking part in more than one CPAs, the CPA will verify within their CDM-SSC-CPA-DD that one or more of the above criteria for debundling are not met.

Finally, if the CPA meets all four of the criteria for debunlding, it will indicate within their CDM-SSC-CPA-DD that the small-scale project activity "Renewable energy project activities with a maximum output capacity equivalent to up to 15 Megawatts (or an appropriate equivalent)" as stated in paragraph 6 (c) of the decision 17/CP.7. This is in concurrence with Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, which states that, "if a proposed small-scale project activity is deemed to be a debundled component, but the total size of such an activity combined with the previous registered small-scale CDM project activity does not exceed the limits for small-scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7, the project activity can qualify to use simplified modalities and procedures for small-scale CDM project activities."

(iv) Assurance that CPA operations/operators are being subscribed to the PoA
All CPA operations/operators will be assured to be subscribed to the PoA and the subscribed electric data will be managed by XXX.

A.4.4.2. Monitoring plan:

The following parameters are monitored to verify the amount of reductions of anthropogenic emissions of greenhouse gases due to CPAs under the PoA.

Table 2. Monitored Parameters

Monitoring Item	Unit	Monitoring Method	Monitoring Frequency	Monitoring Body
Electricity supplied to the grid by the project	MWh	To be measured by meter and will be cross checked by electricity bill	Hourly measured and monthly recording	CPA

The overview of the data recording system is described in A.4.4.1. The managing entity, in this case the XXX, will closely manage the collected data regarding the above parameters. In addition, the managing entity will assist the monitoring process at the CPA level by distributing monitoring manuals and necessary forms for data recording to CPAs, as well as making regular site visits to provide any necessary assistance and advice to the CPAs and solve any issues.

XXX will manage all the data in digital format, which will assure transparency through enabling easy access to the status of CPAs at anytime, as well as preventing double counting.

Further information on the monitoring items will be described in Section E.

A.4.5. Public funding of the programme of activities (PoA):

Public funding from each municipality is involved in this PoA and related CPAs. However, this PoA does not include any diversion of ODA funds. *[#if any ODA fund is not involved in the project]*

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

dd/mm/ 2010

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ☒

According to the "Environmental Impact Evaluation Procedure" by Secretariat of state for the environment and natural resources, in the Dominican Republic, criteria for necessity of environmental impact assessment for hydropower generation project are set depending on the size and location of the hydropower generation project to be implemented. Environmental analysis, therefore, needs to be done at SSC-CPA level rather than PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The legal framework of the procedure of Environmental Impact Assessment in the Dominican Republic is given in Law 64-00 on the Environment and Natural Resources, specifically Articles 9, 17, 18, 38 to 48, 107, 109, 150 and 175, as well as the Regulation of the System on Environmental Permits and Licenses, approved by the Secretariat of State for the Environment and Natural Resources.

According to the categories classified in C.3., for Environmental Impact Declaration, the Environmental Impact Declaration Form (SGA-EIA-FOR-002) will be used. Also all categories of projects should comply with the requirement of Public Consultation established in Law 64-00, the Regulation and the Procedure.

In the case Environmental Impact Study or complementary environmental studies are required, the Directorate of Environmental Evaluation will determine the TOR that will serve to guide the corresponding studies. When pertinent, the Ministry of Environment and Natural Resources can request

the promoter to submit a proposal for TOR, which will serve as basis for the definitive TOR of the project.

For transboundary impacts, there is no specific documentation required, however, transboundary impacts is only expected by the project located at the river which flows into Haiti which shares the same island with the Dominican Republic.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

According to the "Environmental Impact Evaluation Procedure" by Secretariat of state for the environment and natural resources, in the Dominican Republic, Environmental Impact Assessment Category for hydropower generation projects are classified as in the Table 3.

Table 3. Environmental Impact Analysis Category by Size of Plants

Size	Category
1~3MW	C
3~15MW[3]	B

Projects of Category B are projects expected to have limited influence to the area while projects of Category C are projects with moderate potential impacts that are easily prevented or corrected with appropriate practices of construction and operation.

If the project site is located in a place with very high fragility, Environmental Impact Study is required regardless the size of hydropower generation facilities. If the fragility of the project site is classified as "high", only the hydropower generation project exceeding 3MW is required to conduct Environmental Impact Study. In other cases, only Environmental Impact Declaration and Complementary Environmental Study (in some cases) are required as shown in the Table 4.

Table 4. Necessary document by category

Necessary document by category		Fragility Index of the Project Site			
		Very High	High	Moderate	Low
A	Environmental Impact Study	✓	✓		
	Environmental Impact Declaration				
B	Environmental Impact Study	✓	✓		
	Environmental Impact Declaration			✓*	✓*
C	Environmental Impact Study	✓			
	Environmental Impact Declaration		✓*	✓	✓

*: Depending on the necessity, Complementary Environmental Study, defined based on the revision of the corresponding Environmental Impact Declaration, is required.

Environmental Impact Study is defined as a set of technical and scientific activities for the identification, prediction and control of environmental impacts of a project and its alternatives, presented as technical report and conducted according to criteria established by rules in force. It is an interdisciplinary and replicable study, and includes measures to prevent, mitigate and/or compensate the identified impacts,

[3] 15MW is the maximum size under the PoA although the maximum size of this category is 20MW in the regulation.

establishing the management and adaptation program that is needed for the project implementation, including the monitoring plan as well.

Environmental Impact Declaration is the document resulting from the analysis of a proposed action, from the viewpoints of its effect on the environment and the natural resources, where positive and negative effects are stated, as well as the measures needed for mitigation, prevention or compensation; establishing the Program for the Environmental Management and Adaptation. This document serves as basis for the evaluation of those projects with well known impacts that do not require more detailed environmental studies.

Complementary Environmental Study is the study required by the Ministry of Environment and Natural Resources to complete the identification and analysis of the impacts of a project, work or activity, in reference to specific issues of special interest.

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☒
2. Local stakeholder consultation is done at SSC-CPA level ☒

Prior to the implementation of this Project, interviews were held for the purpose of explaining the objectives, processes, implications and benefits for sustainable development of the PoA to relevant stakeholders, including the representatives from the National Agencies, Financial Institution, environmental NGOs, etc. Further stakeholders' comments, especially at the CPA levels must be collected through interviews with local agencies and citizens who are specifically related to the CPAs.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Public comments were collected by individual interviews from the following organizations during the period between September 2008 and January 2009.

- National Agencies: Ministry of Environment and Natural Resources, XXX, XXX
- Environmental NGO: XXX, XXX
- International aid agencies: United Nations Development Programme, XXX, XXX
- Financial Institution: XXX, XXX

As described in D.1., comments from responsible persons of local agencies and citizens who are specifically related to the Project will be gathered at a later date through interviews at the CPA level.

D.3. Summary of the comments received:

Interviewees were generally very supportive towards the implementation of the PoA, viewing it as a positive opportunity for the Dominican Republic to gain the technological and financial support from XXX *[#investing country]* in order to shift its energy supply to more renewable sources, as well as create

opportunities to provide positive impacts to rural agricultural communities. Moreover, no direct objections to the implementation of the Project were expressed during or after the interviews and public comments.

D.4. Report on how due account was taken of any comments received:

All clarifications requested by local attending stakeholders were addressed during the discussion.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

SSC AMS-I.D. "Grid connected renewable electricity generation (ver.15)" was applied to the baseline and monitoring methodologies in the PoA. Methodological Tool in Annex 12 of the EB 35 meeting Report: "Tool to calculate the emission factor for an electricity system (ver.02)" was also applied as references for SSC AMS-I.D (ver.15).

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

This PoA applies SSC AMS-I.D (ver.15). Justifications of the choice of SSC AMS-I.D (ver.15) are described in Table 5.

Table 5. Applicability Criteria and Justification

Applicability Criteria of SSC AMS-I.D (ver.13)	Justification of Applicability
1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	All CPAs under the PoA comprises mini-hydropower generation facilities that supply electricity to the grid
2. If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel1, the capacity of the entire unit shall not exceed the limit of 15MW.	N/A
3. Combined heat and power (co-generation) systems are not eligible under this category.	None of the CPAs will employ co-generation systems
4. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct2 from the existing units.	All CPAs under the PoA will apply the mini-hydropower generation facilities producing less than, or equal to, 15 MW of renewable energy
5. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	None of the CPAs under the PoA will retrofit or modify existing power generation facilities

E.3. Description of the sources and gases included in the SSC-CPA boundary

The boundary applies to each CPAs under the PoA and includes the physical and geographic location of each mini-hydropower generation facility. No greenhouse gas emissions are to be generated within the project boundary of the PoA because fossil fuel is not used for electricity generation or transportation.

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The alternative baseline scenarios to a typical CPA under this PoA are identified as follows:

1) Alternative 1: The proposed project activity is not undertaken as a CDM project activity;
2) Alternative 2: An equivalent amount of annual electricity is generated by other renewable electricity sources (The proposed project activity will not be undertaken); and
3) Alternative3: An equivalent amount of annual electricity is generated by the existing power distribution system (The proposed project activity will not be undertaken) .

Of the three alternative scenarios above, Alternative 1 and Alternative 2 are unlikely to be the baseline scenario because of the following reasons:

Alternative 1: There are barriers for its implementation as stated in E.5.
Alternative 2: The physical conditions at the Project site are not suitable for wave, tidal or geothermal power generation. Furthermore, solar, wind and biomass power generation are not financially feasible at the site.

Therefore, the practical and feasible baseline scenario is Alternative 3, which is the generation of electricity from the existing power distribution system. At this scenario, electricity is supplied to the grid by existing power plants where much of their power is generated from burning of fossil fuel, causing greenhouse gas emissions into the atmosphere.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

In the absence of the PoA, mini-hydropower generation will not be implemented, and electricity will be supplied to the grid from existing power plants where much of their power is generated from fossil fuel combustion. The existence of the following barriers prevents the implementation of a project activity (a typical CPA without CDM), thus greenhouse gasses will continue to be emitted into the atmosphere within the process of electricity generation.

Determination of additionality will be established in line with Attachment A of Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities. The project participants will provide an explanation to show that the project activity would not have occurred without the PoA,

due to at least one of the following barriers: investment barrier, technology barrier, barrier due to prevailing practice and other barriers.

For a typical CPA under this PoA will be applicable to the following barriers:

(a) Technology barrier
The XXX *[#description of the technology applied]* applied in this CPA is a unique technology developed in XXX *[#host country]*, where the generator can be installed within (natural rivers and/or existing irrigation system and canals)*[#please select suitable one]*. To this day, there is no known case of the instalment of this technology in the Dominican Republic. Therefore, manufacturing and maintenance capacity of this particular technology is limited, thus causing a technology barrier to the implementation of the CPA.

(b) Barrier due to prevailing practice
There are very few existing mini-hydropower plants in the Dominican Republic. In addition, the technology to be applied to a typical CPA is the first of its kind technology in terms of hydropower generation facility to be installed at (natural river and/or an existing irrigation system and canals)*[#please select suitable one]* Therefore there is a barrier due to prevailing practice.

(c) Other barriers: Access-to-finance barrier
Due to the small-scale nature of mini-hydropower generation, procurement of funds from financing banks without CDM is extremely challenging. The project activity cannot access appropriate capital without being implemented under the CDM scheme since implementation as the CDM project is the crucial factor for some financing banks to approve the loan.

Impact of CDM registration
CDM registration will enable CPAs to receive low-income loans from a financial institution. In addition, the approval and registration of the CDM project will alleviate the identified barriers through diversion of some risks in the project to the CDM partner. Moreover, additional revenue from CER sales, technology transfer and investment from countries will allow the XXX to finance and implement new hydropower projects.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Below are the key criteria for assessing the additionality of the CPA when proposed to be included in the registered PoA.

- Technology barrier: The applied technology is theXXXX, which is an advanced technology that has not been implemented in the Dominican Republic and manufacturing and maintenance capacity of this particular technology is limited.
- Barrier to prevailing practice: The technology applied is the first of its kind technology in terms of hydropower generation facility to be installed within water at a canal in the Dominican Republic.
- Other barrier: Access-to-finance barrier: A statement from the financing bank that the implementation as the CDM is critical in the approval of the loan.

CPA under PoA must meet at least one of the above criteria to meet the additionality requirement.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Baseline emissions and project emissions are calculated by the equations defined by SSC AMS-I.D. "Grid connected renewable electricity generation (ver.15)". The parameters used for calculation are locally obtained values and default values determined by IPCC Guidelines for National Greenhouse Gas Inventories (2006).

According to SSC AMS-I.D., the yearly emission factor of the grid should be calculated referring to Methodological Tool in Annex 12 of the EB 35 Meeting Report: "Tool to calculate the emission factor for an electricity system (ver.02)" (referring to equation (1) in E.6.2.).

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

(i) Baseline Emissions

Based on SSC AMS-I.D., baseline emissions are obtained by the following steps:

Step 1. Emission Factor Calculation

Step 1-1. Select an Emission Factor Option

The baseline is the electricity generation (MWh) produced by the renewable generating unit multiplied by an emission factor (tCO2e/MWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

This PoA applied option (a) for calculation of the baseline emission factor.

Step 1-2. Determination of OM Emission Factor Calculation Method

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

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

The annual load duration curve and grid system dispatch data is necessary for Method (b) and (c) respectively; however, these datas are not open to public. Therefore, Methods (b) and (c) cannot be applied to this PoA.

Renewable energy (hydro, geothermal, wind, biomass, solar) and nuclear power are considered as sources of low-cost/must-run power generation. Therefore, Method (a) is obtained by the weighted average of the unit electricity generation volume of power plants excluding renewable energy and nuclear power plants. On the other hand, Method (d) is the average emission factor of all power plants connecting to the grid.

Method (a) can be used only if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Based on "Tool to calculate the emission factor for an electricity system", this PoA will utilize Method (a) if the 5-year generation-weighted average data indicates that the percentage of electricity generated from low-cost/must-run power plants are less than/equal to 50% of the total electricity generated within the grid. If this percentage is above 50%, Method (d) will be applied.

The data officially publicized by the Government of Dominican Republic is shown in the Table 6.

Table 6. OM Calculation Method to Be Applied to The Grid Systems in The Dominican Republic

Grid	Proportion of Electricity Supply by Low-cost/Must-run Power Plants (2003-2007)	Option applied
XXXX	XX% < 50%	Simple OM or Average OM

Step 1-3. Calculate The OM Emission Factor According to The Selected Method.

Calculation of Simple OM [Method (a)]

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

$$EF_{grid,OMsimple,y} = \frac{\sum_i F_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{GEN_y} \quad \text{……Equation (1)}$$

Where,

$EF_{grid,OMsimple,y}$: Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$: CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
GEN_y: Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i: All fossil fuel types combusted in power sources in the project electricity system in year y

y: Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the Designated Operational Entity for validation (ex ante option)

For calculation, if only electricity generation and the fuel types used is available, the emission factor should be determined based on the CO2 emission factor of the fuel type used and the efficiency of the power unit.
In the Dominican Republic, data on the fossil fuel consumption for power generation is not publicly available, and therefore, for this PoA, the heat energy content (Heat Rate) as an indication of the efficiency of each fuel type is used for the calculation of "$F_{i,a,y}$ multiplied by $NCV_{i,y}$ " as shown in the Equation (2):

$$F_{i,y} \times NCV_{i,y} = GEN_{i,y} \times HeatRate_i \times CF \times 1000 \quad \text{……Equation (2)}$$

Where,
$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$GEN_{i,y}$: The average power generation for the year y from fossil fuel type i (MWh).
Heat $Rate_i$: The heat energy content of the fuel needed to produce one kilowatt hour of electricity (BTU/kWh)
CF: Conversion factor from BTU into TJ(TJ/BTU)

Simple OM can be derived using either of the following two data vintages for years y:

1. A 3-year average, based on the most recent statistics available at the time of Project Design Document (PDD) submission or (ex ante);
2. The year in which project generation occurs, if the Simple OM emission factor is to be updated based on ex post monitoring.

For this PoA, ex ante approach (a 3-year average data) is applied.

$EF_{CO2,i,y}$ in the Equation (1) is obtained by the Equation (3) as follows:

$$EF_{CO2,i,y} = CC_i \times OXID_i \times 44/12 \quad \text{……Equation (3)}$$

Where,
$EF_{CO2,i,y}$: CO2 emission factor of fuel type i (tCO2/GJ)
CC_i: Carbon Contents of fuel type i (tC/TJ)
$OXID_i$: Carbon oxidation factor of the fuel type i (%)

Calculation of Average OM [Method (d)]

The average OM emission factor ($EF_{grid,OM\text{-}ave,y}$) is calculated as the average emission rate of all power plants serving the grid, using the methodological guidance as described under Method (a) Equation(1) above for the simple OM, but including in all equations also low-cost/must-run power plants.

Step 1-4. Identify the Cohort of Power Units to Be Included in The Build Margin (BM) .

Sample Group of Power Units

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

(a) The set of five power units that have been built most recently, or

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

Project participants should use the set of power units that comprises the larger annual generation.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

Vintage of Data

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1.

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

Option 2.

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

For this PoA, Option 1 is applied.

Step 1-5. Calculate The Build Margin Emission Factor.

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

$$EF_{grid,BM,y} = \frac{\sum_{m} GEN_{m,y} \times EF_{EL,m,y}}{\sum_{m} GEN_{m,y}} \qquad \text{……Equation (4)}$$

Where,

$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y (tCO2/MWh)

$GEN_{m,y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$: CO2 emission factor of power unit m in year y (tCO2/MWh)
m : Power units included in the build margin
y : Most recent historical year for which power generation data is available

The CO2 emission factor of each power unit m (EFEL,m,y) will be determined as per Step1-3. Method (a) for the simple OM using "y" for the most recent historical year for which power generation data is available, and using "m" for the power units included in the build margin.

Step 1-6. Calculate The Combined Margin (CM) Emissions Factor.

According to the above equations, the emission factor of the system power supply (combined margin, CM) is determined by the CO2 emission factor of system power supply (CEF_y). CEF is average of OM and BM described as follows:

$$CEF_y = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{……Equation (5)}$$

Where,

CEF_y: CO2 emission factor of system power supply ($tCO2_{eg}$ /MWh)
$EF_{grid,OM,y}$: Operating margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
w_{OM}: Weighting of operating margin emissions factor (%)
w_{BM}: Weighting of build margin emissions factor (%)

w_{OM} = 0.5 and w_{BM} = 0.5 for this crediting period.

The Government of Dominican Republic officially publicizes the Emission Factor of the national grids of the country as shown in Table 7 derived from the calculation process mentioned above.

Table 7. Emission Factor of The System Power Supply (CEF_y)

Grid	OM ($tCO2_{eg}$ /MWh)	BM ($tCO2_{eg}$ /MWh)	CM ($tCO2_{eg}$ /MWh)
Norte	XXXX	XXXX	XXXX
…	XXXX	XXXX	XXXX

STEP 2. Calculation of Baseline Emissions

Baseline emissions is calculated by equation (6).

Renewable energy generation volume (MWh) for the baseline emissions calculations was derived utilizing data with high transparency. Baseline emissions from system power supply are determined as follows with CEF_y shown in the Table 7.

$$\underset{(tCO2_{eq}/y)}{BEy_{,grid}} = \underset{(MWh)}{EG_y} \times \underset{(tCO2_{eg}/MWh)}{CEF_y} \quad \text{……Equation (6)}$$

$$\underset{(MWh)}{EG_y} = \underset{(MW)}{Electricity_y} \times \underset{(h/y)}{T_y} \quad \text{……Equation (7)}$$

Where,
$BE_{y,grid}$: Annual baseline emissions from system power supply ($tCO2_{eq}$/year)
$Electricity_y$: Power generation capacity of installed plant (MW)
T_y: Operation hours of installed plant (h/y)
CEF_y: CO2 emission factor of system power supply ($tCO2_{eg}$ /MWh)

(ii) Project Emissions

This Project does not use fossil fuel within its entire activity. Therefore, Project Emission is zero.

(iii) Leakage Emissions

Emissions from leakage are calculated in the following cases:

- When power generation facilities are transferred from other activities or existing power generation facilities are transferred into other activities.
- Biomass resources are used for power generation in the project activity

This project activity does not apply to either of the above cases. Therefore, no leakage will be generated by the Project.

(iv) Emissions Reduction of Greenhouse Gas

GHG emissions reduction is calculated as indicated in equation (8).

$$\underset{(tCO2_{eq}/y)}{ER_y} = \underset{(tCO2_{eq}/y)}{BE_y} - \left(\underset{(tCO2_{eq}/y)}{PE_y} + \underset{(tCO2_{eq}/y)}{Leakage_y} \right) \quad \text{……Equation(8)}$$

ERy: Emissions reduction in year "y" ($tCO2_{eq}$/y)
BEy: Baseline emissions in year "y" ($tCO2_{eq}$/y)
PE_y: Project emissions in year "y" ($tCO2_{eq}$/y)
$Leakage_y$: Emissions due to leakage in year y ($tCO2_{eq}$/y)

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

The detailed information on the data and parameters not requiring monitoring are described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in E.7.1.

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by all power sources serving the system in year y (for calculation of Simple OM, low-cost / must-run power plants / units is not included in the figure)

Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{i,y}$
Data unit:	MWh
Description:	The average power generation for the year y from fossil fuel type i
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{m,y}$
Data unit:	MWh
Description:	Net quantity of electricity generated and delivered to the grid by power unit m in year y
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	The statistics data provided by the Department of Energy
Any comment:	

Data / Parameter:	Heat $Rate_i$
Data unit:	BTU/kwh
Description:	Heat energy content of the fuel needed to produce one kilowatt hour (kWh) of electricity. It is a measure of a plant's energy efficiency, expressed in British Thermal Units per kWh (BTU/kWh).
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually	Official released statistic; publicly accessible and reliable data source

applied:	
Any comment:	

Data / Parameter:	$EF_{CO2,I}$
Data unit:	tCO2/TJ
Description:	The carbon emission factor of fuel type I
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$CC_{,i}$
Data unit:	tC/TJ
Description:	Carbon contents of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$OXID_{,i}$
Data unit:	%
Description:	Carbon oxidation factor of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	CF
Data unit:	TJ/BTU
Description:	Conversion factor from BTU into TJ
Source of data used:	-
Value applied:	1.055×10^{-9}
Justification of the	Theoretical value

choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$Electricity_y$
Data unit:	MW
Description:	Power generation capacity of installed plant
Source of data used:	Based on each CPA's project plan
Value applied:	Depending on the plan of each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	T_y
Data unit:	hours/year
Description:	Operation hours of installed plant
Source of data used:	Based on each CPA's project plan
Value applied:	Depending on the plan of each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied to the grid by the project in the year y
Source of data to be used:	Measurements undertaken by the facility operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Depending on the scale of hydropower facility which varies for each CPA
Description of	- Date will be measured by electricity meter connected to the grid

measurement methods and procedures to be applied:	- Data will be measured each hourly and recorded monthly
QA/QC procedures to be applied:	Periodic international calibration will be implemented. Data collected through measuring device will be crosschecked with receipts indicating the electricity generation volume.
Any comment:	Data will be kept for two years after the last issuance of CERs for this activity.

E.7.2. Description of the monitoring plan for a SSC-CPA:

Monitoring and reporting framework is shown in Figure4. The operation and management of each power generation facilities are carried out by the power producers. Based on a project operation and monitoring manual, electricity data will be collected, managed, and monitored by the XXX. XXX will undertake data checking, calculation of emission reduction, site visits and provision of advice to the XXX. XXX will also be responsible for communication with Designated Operational Entity for verification procedures (Refer to Figure4. Layout of Record Keeping System).

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

dd/mm/2010

[#Name]
[#Company]
[#Address]
Tel: XXX, FaXXXx

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

Baseline information is described in Section E.

Annex 4

MONITORING INFORMATION

Refer to Section D. for the Monitoring Information

- - - - -

PDD Modelo 2

Programmatic CDM for mini-hydropower generation (CPA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM
(CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small-scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[4,5] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[4] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[5] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

"Programmatic CDM for Mini-Hydropower Generation in XXXX, the Dominican Republic"
Version 1
dd/mm/2010

A.2. Description of the small-scale CPA:

Description of the CPA:
This CPA is implemented under the Programmatic of Activity (PoA), "Programmatic CDM for Mini-Hydropower Generation in the Dominican Republic" The coordinating/managing entity of this PoA is the XXXX, which is a XXXX*[#description of the organization]*.

The goals of the PoA are to achieve the national strategy and public interest objectives stated in the "Incentive to Renewable Energy and Special Regimes (Law 57-07)" by promoting establishment of mini-hydropower generation systems throughout the country, such as a) increasing the energy diversity and the self-sufficiency of the country, b) reducing dependency on imported fossil fuel, c) stimulating private investment projects in renewable energy sources, d) mitigating the negative environmental impacts of the energy operations with fossil fuel, and e) favouring community social investment in renewable energy projects etc.

By promoting the implementation of environmentally friendly mini-hydropower generation projects that utilize (water head of natural rivers and/or unused heads of manmade canals)*[#please select the suitable expression]*, greenhouse gas emissions will be avoided by replacing electricity generated from fossil fuel combustion with renewable energy for power supply to the grid.

This CPA aims to generate renewable energy utilizing a mini-hydropower generation facility installed at (a natural river/an manmade canal) in XXXX, XXXX Province. The generated hydropower will replace the existing electricity supply to the grid, which includes electricity from power plants that use fossil fuels for power generation. Therefore the implementation of the CPA will reduce the overall greenhouse gas emissions. Estimated annual power generation is XXXX GWh (XXXX kW rating). Annual emissions reduction from the CPA is expected to be XXXX t CO_2 equivalent (a total of XXXX t CO_2 equivalent within the first crediting period).

The implementer of the CPA is the XXXX of XXXX, which is responsible for the collection and monitoring of data as well as the operation and management of the mini-hydropower generating facility.

In this CPA, electricity is generated at a canal drop with a XXm-fall height (minimum fall is XXm). Maximum water plant discharge is set at XXm^3/s, which is the most economically efficient flow rate estimated from the measured data. XXXX is installed.

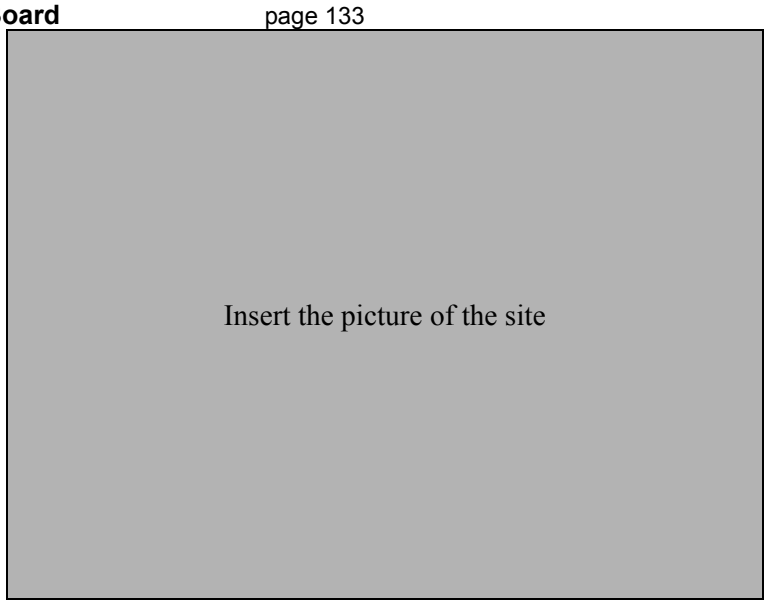


Figure1. Project site of the CPA

Purpose of the CPA:

The purpose of the CPA is to "co-benefit" both the global environmental aim to reduce greenhouse gas emissions, as well as the local socio-economic needs. Promoting the implementation of mini-hydropower generation through this CPA contributes to the sustainable development of XXXX area in XXXX Province by bringing about the following economic, social and environmental benefits:

Economic/Social Benefits

- Decrease of dependency on imported fossil fuel and increase the energy security of the country:
  The Dominican Republic is heavily depending on imported fuel and the Government decided to promote renewable energy to increase energy self-sufficiency and diversity of the energy sources of the country.
- Sustainable hydropower development: Because of the small-scale, simple hydropower system, the investment cost for the Project implementation is low. Power producers can utilize the revenues generated through electricity generation and CER sales to further develop hydro energy that meets the financial and social needs of the local communities. This will lead to the socioeconomic development of agricultural communities throughout the Dominican Republic.
- Enhancement of private investments including foreign investment to the local economy: Investment by private companies including foreign investment for the implementation of the Project will contribute to the local economy.
- Creation of job opportunities: New jobs may be created by this Project in the fields of operation and maintenance of the power generation facilities.

Environmental Benefits

- Reduction of greenhouse gas emissions
- Generation of renewable energy without new development of natural landscapes: No new natural land needs to be developed because the mini-hydropower system will utilize the existing irrigation canals.*[#applicable to only the case of canal/irrigation system mini-hydropower generation system]*

- Emissions Reduction of air pollutants (SOx, Nox): SOx, NOx emission will be reduced through replacing conventional grid electricity, most of which are generated through burning of fossil fuel, with hydro electricity.
- Reduction of improper waste accumulation in irrigation system and canals: Hydropower system will require periodic removal of waste to avoid waste materials from disrupting the power generator. *[#applicable to only the case of irrigation system/canal mini-hydropower generation system to be applied]*

A.3. Entity/individual responsible for the small-scale CPA:

The implementer of the CPA is XXXX.

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

the Dominican Republic

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The project site (location of the mini-hydropower generating facility) in XXXX is located at an existing irrigation canal. Latitude of the project site is N XX° XX′ XX″ , and longitude is E XX° XX′ XX″ .

Map

Figure2. Location of the Project Site

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

This starting date of this CPA is 1st of XXXX, which is the same date as the proposed PoA.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

21years

A.4.3. Choice of the crediting period and related information:

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

>>
The starting date of the crediting period is the registration date.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Table 1. Estimated amount of emission reductions

Years	**Estimation of annual emission reductions (tCO_2e)**
2009	XXXX
2010	XXXX
2011	XXXX
2012	XXXX
2013	XXXX
2014	XXXX
2015	XXXX
Total emission reductions (tCO_2e)	XXXX
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tCO_2e)	XXXX

A.4.5. Public funding of the CPA:

Public funding from each related municipality is involved in this CPA. However, this CPA does not include any diversion of ODA funds.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM or an application to register another small-scale CDM with the following characteristics:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The project participant of the CPA is XXXX. This CPA is the first and only CPA that XXXX is part of. Therefore, it can be inferred that the CPA does not have the same project participants with any other CPAs (first criteria), thus verifying that the CPA is not a debundled component of another CPA.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

XXXX, who is the managing entity of the PoA in which this CPA is under, will periodically obtain and update information regarding CDM project activities and PoAs related to hydropower generation. Prior to the implementation of the CPA, XXXX will verify that the small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA by crosschecking the geographic location of the CPA with existing CDM project activities.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

"Mini-Hydropower Generation Programme Utilizing Irrigation Canal in the Dominican Republic"
Version 1

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

This CPA is eligible to be included in the registered PoA since it satisfies the criteria defined in A.4.2.2. in CDM-SC-PoA-DD of the registered PoA as described below.

- A mini-hydropower generation project that newly installs a mini-hydropower generation facility at (natural rivers and/or canals)*[#please select]*
  →Applicable
  (The activity of this CPA is described in A.2 of CDM-SC-PoA-DD of the registered PoA)

- Located within the Dominican Republic
  → Applicable
  (The location of this CPA is described in A.4.1.2. of CDM-SC-PoA-DD of the registered PoA)

- Maximum electricity generation volume less than or equal to 15MW
  →Applicable
  (Maximum electricity generation capacity is XXXX kW as shown in A.2.)

- Instalment of a renewable energy facility that supplies electricity to and/or displace electricity from an electricity distribution system that is (or would have been) supplied by at least one fossil fuel fired generating unit.
  →Applicable
  (This CPA is a new facility that provides electricity to a power system that supplies its electricity from more than or equal to one fossil fuel electricity facility, as shown in A.2. of CDM-SC-PoA-DD of the registered PoA)

- Monitors and collects appropriate data on the parameters listed in A.4.4.2 of CDM-SC-PoA-DD of the registered PoA
  → Applicable.
  'Monitoring items in A.4.4.2. of CDM-SC-PoA-DD of the registered PoA will be applied)

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

In the absence of the CPA, there are barriers in the following three areas: the technology barrier, barrier due to prevailing practice and access-to-finance barrier. These barriers have prevented the implementation of hydropower facilities in XXXX. Therefore, electricity remains to be

supplied from the national grid system where much of the electricity is generated from burning fossil fuel, and greenhouse gases are emitted.

a) Technology barrier:
The XXXX applied in this CPA is a unique technology developed in XXXX, where XXXX*[#description of the features of technology]*. To this day, there is no known case of the instalment of this technology in the Dominican Republic. Therefore, manufacturing and maintenance capacity of this particular technology is limited, thus causing a technology barrier to the implementation of the CPA.

b) Barrier due to prevailing practice
There are many existing hydropower plants in the Dominican Republic. However, in terms of hydropower generation utilizing existing irrigation systems, actualization of projects have been very rare. In addition the technology to be applied to the CPA is the first of its kind technology in terms of hydropower generation facility that XXXX *[#description of the features of technology]*. Therefore, there is a barrier due to prevailing practice.

c) Access-to-finance barrier:
Because the size of the hydropower generation system placed within the irrigation system of this CPA is very small, it is extremely difficult to procure funds from the financing banks unless the project is implemented as a CDM project. Implementing this project under the CDM scheme becomes a crucial component of the bank's investment criteria. Therefore, there is an access-to-finance barrier where access to capital will be limited in the absence of the CDM

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The project boundary for this CPA includes the physical and geographic location of each mini-hydropower generation facility. In the baseline scenario, greenhouse gases are emitted by power generation sources of the grid electricity. On the other hand, greenhouse gas will not be emitted within the project boundary and project scenario of this CPA because no fossil fuel is used for electricity generation or transportation.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

The detailed information on the data and parameters that does not require monitoring are described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in B.6.1.

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	*[#Expression should be selected depending on the official data of the Dominican Republic]* Net electricity generated and delivered to the XXXX grid by all power sources

	serving the system in year y not including low-cost / must-run power plants / units Net electricity generated and delivered to the XXXX grid by all power sources serving the system in year y
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{i,y}$
Data unit:	MWh
Description:	The average power generation of the XXXX grid for the year y from fossil fuel type I
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$GEN_{m,y}$
Data unit:	MWh
Description:	Net quantity of electricity generated and delivered to the XXXX grid by power unit m in year y
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	The statistics data provided by the Department of Energy
Any comment:	

Data / Parameter:	Heat Rate$_i$
Data unit:	BTU/kwh
Description:	Heat energy content of the fuel needed to produce one kilowatt hour (kWh) of electricity. It is a measure of a plant's energy efficiency, expressed in British Thermal Units per kWh (BTU/kWh).
Source of data used:	Department of Energy, the Dominican Republic
Value applied:	See Annex 3 for details

Justification of the choice of data or description of measurement methods and procedures actually applied:	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$EF_{CO2,I}$
Data unit:	tCO2/TJ
Description:	The carbon emission factor of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$CC_{,I}$
Data unit:	tC/TJ
Description:	Carbon contents of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	$OXID_{,I}$
Data unit:	%
Description:	Carbon oxidation factor of fuel type i
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas inventories, Table 1-4
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values are adopted.
Any comment:	

Data / Parameter:	CF
Data unit:	TJ/BTU
Description:	Conversion factor from BTU into TJ

Source of data used:	-
Value applied:	1.055×10^{-9}
Justification of the choice of data or description of measurement methods and procedures actually applied:	Theoretical value
Any comment:	

Data / Parameter:	$Electricity_y$
Data unit:	MW
Description:	Power generation capacity of installed plant
Source of data used:	Specification of the facility provided by the maker
Value applied:	XXXX
Justification of the choice of data or description of measurement methods and procedures actually applied:	The specification of the facility is guaranteed by the maker
Any comment:	

Data / Parameter:	T_y
Data unit:	hours/year
Description:	Operation hours of installed plant
Source of data used:	the project plan based on the river flow study
Value applied:	XXXX
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

(ii) Baseline Emissions

Based on SSC AMS-I.D., baseline emissions are obtained by the following steps:

Step 1. Emission Factor Calculation

Step 1-1. Select an Emission Factor Option

The baseline is the electricity generation (MWh) produced by the renewable generating unit multiplied by an emission factor (tCO2e/MWh) calculated in a transparent and conservative manner as:

(c) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(d) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

This CPA applied option (a) for calculation of the baseline emission factor.

Step 1-2. Determination of OM Emission Factor Calculation Method

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

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

The annual load duration curve and grid system dispatch data is necessary for Method (b) and (c) respectively, however, these data are not open to public. Therefore, Methods (b) and (c) cannot be applied to this CPA.

Renewable energy (hydro, geothermal, wind, biomass, solar) and nuclear power are considered as sources of low-cost/must-run power generation. Therefore, Method (a) is obtained by the weighted average of the unit electricity generation volume of power plants excluding renewable energy and nuclear power plants. On the other hand, Method (d) is the average emission factor of all power plants connecting to the grid.

Method (a) can be used only if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Based on "Tool to calculate the emission factor for an electricity system", this CPA will utilize Method (a) if the 5-year generation-weighted average data indicates that the percentage of electricity generated from low-cost/must-run power plants are less than/equal to 50% of the total electricity generated within the grid. If this percentage is above 50%, Method (d) will be applied.

The grid system, which this CPA is to provide electricity, is the XXXX grid. The proportion of electricity supply by low-cost/must-run power plants on average of 2003-2007 is XXXX % which is lower than/exceeds 50%. Therefore, for this CPA, Simple OM/Average OM Method is applied to OM calculation of this CPA.

Table 2 OM Calculation Method to Be Applied to The Grid Systems in The Dominican Republic

Grid	Proportion of Electricity Supply by Low-cost/Must-run Power Plants (2003-2007)	Option applied
XXXX	XX% < 50%	Simple OM or

		Average OM

Step 1-3. Calculate The OM Emission Factor According to The Selected Method.

Calculation of Simple OM [Method (a)]

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the XXXX grid, not including low-cost / must-run power plants / units.

$$EF_{grid,OMsimple,y} = \frac{\sum_i F_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{GEN_y} \quad \text{……Equation (1)}$$

Where,

$EF_{grid,OMsimple,y}$: Simple operating margin CO2 emission factor in year y (tCO2/MWh)

$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,i,y}$: CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)

GEN_y: Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)

i: All fossil fuel types combusted in power sources in the project electricity system in year y

y: Either the three most recent years for which data is available at the time of submission of the CDM-PDD to Designated Operational Entity for validation (ex ante option)

For calculation, if only electricity generation and the fuel types used is available, the emission factor should be determined based on the CO2 emission factor of the fuel type used and the efficiency of the power unit.

In the Dominican Republic, data on the fossil fuel consumption for power generation is not publicly available, and therefore, for this CPA, the heat energy content (Heat Rate) as an indication of the efficiency of each fuel type is used for the calculation of "$F_{i,a,y}$ multiplied by $NCV_{i,y}$ " as shown in the Equation (2):

$$F_{i,y} \times NCV_{i,y} = GEN_{i,y} \times HeatRate_i \times CF \times 1000$$

……Equation (2)

Where,

$F_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$GEN_{i,y}$: The average power generation for the year y from fossil fuel type i (MWh).

Heat $Rate_i$: The heat energy content of the fuel needed to produce one kilowatt hour of electricity (BTU/kWh)

CF: Conversion factor from BTU into TJ(TJ/BTU)

Simple OM can be derived using either of the following two data vintages for years y:

1. A 3-year average, based on the most recent statistics available at the time of Project Design Document (PDD) submission or (ex ante);
2. The year in which project generation occurs, if the Simple OM emission factor is to be updated based on ex post monitoring.

For this CPA, ex ante approach (a 3-year average data) is applied.

$EF_{CO2,i,y}$ in the Equation (1) is obtained by the Equation (3) as follows:

$$EF_{CO2,i,y} = CC_i \times OXID_i \times 44/12 \quad \text{……Equation (3)}$$

Where,
$EF_{CO2,i,y}$: CO2 emission factor of fuel type i (tCO2/GJ)
CC_i: Carbon Contents of fuel type i (tC/TJ)
$OXID_i$: Carbon oxidation factor of the fuel type i (%)

Step 1-4. Identify the Cohort of Power Units to Be Included in The Build Margin (BM) .

Sample Group of Power Units

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

(a) The set of five power units that have been built most recently, or

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

Project participants should use the set of power units that comprises the larger annual generation.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

Vintage of Data

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1.

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

Option 2.

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

For this CPA, Option 1 is applied.

Step 1-5. Calculate The Build Margin Emission Factor.

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

$$EF_{grid,BM,y} = \frac{\sum_{m} GEN_{m,y} \times EF_{EL,m,y}}{\sum_{m} GEN_{m,y}} \quad \text{……Equation (4)}$$

Where,

$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y (tCO2/MWh)
$GEN_{m,y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$: CO2 emission factor of power unit m in year y (tCO2/MWh)
m : Power units included in the build margin
y : Most recent historical year for which power generation data is available

The CO2 emission factor of each power unit m ($EF_{EL,m,y}$) will be determined as per Step1-3. Method (a) for the simple OM using "y" for the most recent historical year for which power generation data is available, and using "m" for the power units included in the build margin.

Step 1-6. Calculate The Combined Margin (CM) Emissions Factor.

According to the above equations, the emission factor of the system power supply (combined margin, CM) is determined by the CO2 emission factor of system power supply (CEF_y). CEF is average of OM and BM described as follows:

$$CEF_y = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{……Equation (5)}$$

Where,

CEF_y: CO2 emission factor of system power supply ($tCO2_{eg}$ /MWh)
$EF_{grid,OM,y}$: Operating margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y ($tCO2_{eg}$ /MWh)
w_{OM}: Weighting of operating margin emissions factor (%)
w_{BM}: Weighting of build margin emissions factor (%)

w_{OM} = 0.5 and w_{BM} = 0.5 for this crediting period.

According to the above equation, the emission factor of the system power supply (combined margin) for this CPA is determined by the average of OM and BM.

Table 3 Emission Factor of The System Power Supply (CEF_y)

Grid	OM ($tCO2_{eg}$ /MWh)	BM ($tCO2_{eg}$ /MWh)	CM ($tCO2_{eg}$ /MWh)
Norte	XXXX	XXXX	XXXX
…	XXXX	XXXX	XXXX

STEP 2. Calculation of Baseline Emissions

Baseline emissions is calculated by Equation (6).

Renewable energy generation volume (MWh) for the baseline emissions calculations was derived utilizing data with high transparency. Baseline emissions from system power supply are determined as follows with CEF_y shown in the Table 3.

$$\underset{(tCO2_{eq}/y)}{BEy_{,grid}} = \underset{(MWh)}{EG_y} \times \underset{(tCO2_{eg}/MWh)}{CEF_y} \quad \text{……Equation (6)}$$

$$\underset{(MWh)}{EG_y} = \underset{(MW)}{Electricity_y} \times \underset{(h/y)}{T_y} \quad \text{……Equation (7)}$$

Where:

Parameter	Description	Figure	Unit	Data Source
$BE_{y,grid}$	Annual baseline emissions from system power supply	Calculated by equation (6)	t $CO2_{eq}$/year	-
$Electricity_y$	Power generation capacity of installed plant	XXXX	MW	Based on the project plan of this CPA
T_y	Operation hours of installed plant	XXXX	h/y	Based on the project plan of this CPA
CEF_y	CO2 emission factor of system power supply	XXXX	$tCO2_{eg}$ /MWh	Calculated by equation (5)

(iii) Project Emissions

This CPA does not use fossil fuel within its entire activity. Therefore, project emission is zero.

(iv) Leakage Emissions

Emissions from leakage are calculated in the following cases:

- When power generation facilities are transferred from other activities, or existing power generation facilities are transferred into other activities.
- Biomass resources are used for power generation in the project activity

This CPA does not apply to either of the above cases, therefore, no leakage will be generated by the project.

(v) Emissions Reduction of Greenhouse Gas

GHG emissions reduction is calculated as indicated in Equation (8).

$$\underset{(tCO2_{eq}/y)}{ER_y} = \underset{(tCO2_{eq}/y)}{BE_y} - \left(\underset{(tCO2_{eq}/y)}{PE_y} + \underset{(tCO2_{eq}/y)}{Leakage_y} \right) \quad \text{……Equation(8)}$$

ER_y: Emissions reduction in year "y" ($tCO2_{eq}/y$)
BE_y: Baseline emissions in year "y" ($tCO2_{eq}/y$)
PE_y: Project emissions in year "y" ($tCO2_{eq}/y$)
$Leakage_y$: Emissions due to leakage in year y ($tCO2_{eq}/y$)

B.5.3. Summary of the ex-ante estimation of emission reductions:

Table 4. Summary of Ex-ante Estimation of Emission Reduction

Year	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of leakage (tCO_2 e)	Estimation of overall emission reductions (tCO_2 e)
2010	0	XXXX	0	XXXX
2011	0	XXXX	0	XXXX
2012	0	XXXX	0	XXXX
2013	0	XXXX	0	XXXX
2014	0	XXXX	0	XXXX
2015	0	XXXX	0	XXXX
2016	0	XXXX	0	XXXX
Total (tCO_2e))	0	XXXX	0	XXXX

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

(i) Monitoring and reporting framework

Monitoring and reporting framework is shown in Figure 3 below. The operation and management of mini-hydropower generation facility is carried out by XXXX *[#the mini-hydropower generation facility operator]*. Based on monitoring manual that is provided by the XXXX*[#CME's name]*, XXXX *[#the mini-hydropower generation facility operator]* will monitor the electricity volume and will report to XXXX*[#CME's name]*, who will then undertake data checking, calculation of emission reduction, site visits and provision of advice to the municipalities. XXXX*[#CME's name]* will also be responsible for communication with Designated Operational Entity for verification procedures.

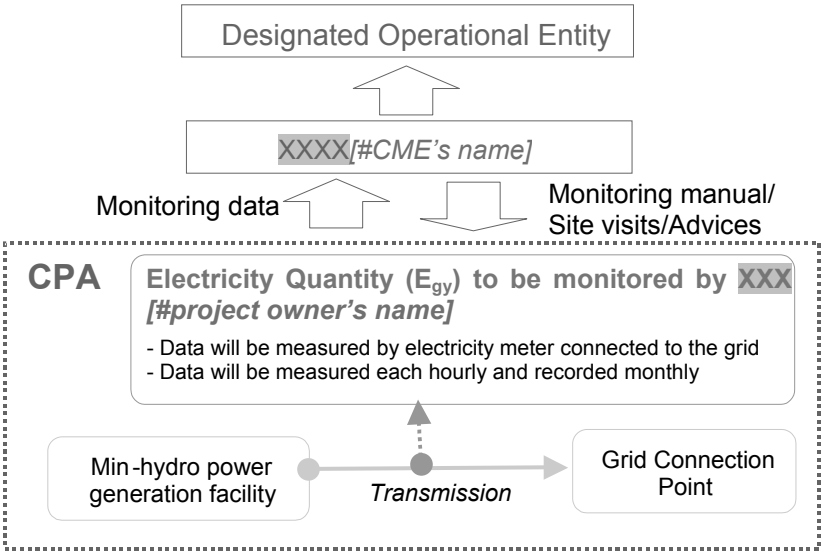


Figure 3. Monitoring plan for this CPA

(ii) Monitoring method

The detailed information of the monitoring items and their monitoring methods are described below.

Data / Parameter:	EGy
Data unit:	MWh
Description:	Electricity supplied to the grid by the project in the year y
Source of data to be used:	Measurements undertaken by the XXXX
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXXX
Description of measurement methods and procedures to be applied:	- Date will be measured by electricity meter connected to the grid - Data will be measured each hourly and recorded monthly
QA/QC procedures to be applied:	Periodic international calibration will be implemented. Data collected through measuring device will be crosschecked with receipts indicating the electricity generation volume.
Any comment:	Data will be kept for two years after the last issuance of CERs for this activity.

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The legal framework of the procedure of Environmental Impact Assessment in the Dominican Republic is given in Law 64-00 on the Environment and Natural Resources, specifically Articles 9, 17, 18, 38 to 48, 107, 109, 150 and 175, as well as the Regulation of the System on Environmental Permits and Licenses, approved by the Secretariat of State for the Environment and Natural Resources.

According to the categories classified in C.3., for Environmental Impact Declaration, the Environmental Impact Declaration Form (SGA-EIA-FOR-002) will be used. Also all categories of projects should comply with the requirement of Public Consultation established in Law 64-00, the Regulation and the Procedure.

(Environmental Impact Study/complementary environmental study) *[#Please select the appropriate one]* was conducted based on the TOR determined by the Directorate of Environmental Evaluation. The results are XXXX*[#Please summarize the result of the study]*.

[#Please use suitable expression among below]

No transboundary impacts are expected by the project because the project is located at the (river/canal) which does not flow into outside area of the country, and hence, no specific documentation is required regarding transboundary impact of this project.

For transboundary impacts, there is no specific documentation required, in addition, very little transboundary impacts are expected by the project because XXXX.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

According to the "Environmental Impact Evaluation Procedure" by Secretariat of state for the environment and natural resources, in the Dominican Republic, Environmental Impact Assessment Category for hydropower generation projects are classified as in the Table 3.

Table 3. Environmental Impact Analysis Category by Size of Plants

Size	Category
1~3MW	C
3~15MW[6]	B

Projects of Category B are projects expected to have limited influence to the area while projects of Category C are projects with moderate potential impacts that are easily prevented or corrected with appropriate practices of construction and operation.

If the project site is located in a place with very high fragility, Environmental Impact Study is required regardless the size of hydropower generation facilities. If the fragility of the project site is classified as "high", only the hydropower generation project exceeding 3MW is required to conduct Environmental Impact Study. In other cases, only Environmental Impact Declaration and Complementary Environmental Study (in some cases) are required as shown in the Table 4.

Table 4. Necessary document by category

Necessary document by category		Fragility Index of the Project Site			
		Very High	High	Moderate	Low
A	Environmental Impact Study	✓	✓		
	Environmental Impact Declaration				
B	Environmental Impact Study	✓	✓		
	Environmental Impact Declaration			✓*	✓*
C	Environmental Impact Study	✓			
	Environmental Impact Declaration		✓*	✓	✓

*: Depending on the necessity, Complementary Environmental Study, defined based on the revision of the corresponding Environmental Impact Declaration, is required.

Environmental Impact Study is defined as a set of technical and scientific activities for the identification, prediction and control of environmental impacts of a project and its alternatives, presented as technical report and conducted according to criteria established by rules in force. It is an interdisciplinary and replicable study, and includes measures to prevent, mitigate and/or

[6] 15MW is the maximum size under the PoA although the maximum size of this category is 20MW in the regulation.

compensate the identified impacts, establishing the management and adaptation program that is needed for the project implementation, including the monitoring plan as well.

Environmental Impact Declaration is the document resulting from the analysis of a proposed action, from the viewpoints of its effect on the environment and the natural resources, where positive and negative effects are stated, as well as the measures needed for mitigation, prevention or compensation; establishing the Program for the Environmental Management and Adaptation. This document serves as basis for the evaluation of those projects with well known impacts that do not require more detailed environmental studies.

Complementary Environmental Study is the study required by the Ministry of Environment and Natural Resources to complete the identification and analysis of the impacts of a project, work or activity, in reference to specific issues of special interest.

Based on the above, this CPA needs to prepare XXXX.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☒ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

As indicated in the proposed PoA, interviews with the stakeholders at the PoA level were conducted. They were given the opportunity to discuss and provide comments to the PoA.

In addition to the interviews at the PoA level, comments from responsible persons of local agencies and citizens who are specifically related to the Project will be collected at a later date through interviews at the CPA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

[#The method how stakeholders comments are received is summarized here]

D.3. Summary of the comments received:

[#Comments from local citizens and related agencies are summarized here.]

D.4. Report on how due account was taken of any comments received:

[#The report on how the comments are received will be described here.]

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE small-scale CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

Detail baseline information is described in Section E.

Annex 4

MONITORING INFORMATION

Refer to Section B.6.1 for the Monitoring Information.

- - - - -

PDD Modelo 3

Programmatic CDM for biogas recovery

from swine waste treatment system (PoA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small-scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

"Programmatic CDM for Biogas Recovery from Swine Waste Treatment System in the Dominican Republic"
Version 1
dd/mm/2010

A.2. Description of the small-scale programme of activities (PoA):

A.2.1. General operating and implementing framework of PoA

The "Programmatic CDM for Biogas Recovery from Swine Waste Treatment System in the Dominican Republic" is to promote sustainable waste management system in swine industry of the Dominican Republic as well as reduction of greenhouse gas emission from the industry.

The PoA consists of the two major components: biogas collection by introducing anaerdobic digesters and combustion of the collected biogas by open flare system. The biogas may be utilized as thermal energy if there is a need for it, however, in most CPAs under the PoA, the collected biogas will not be utilized, but burned by open flare system as there is little thermal energy need around swine farms in the country in general. In addition, even if the biogas is used as thermal energy source, amount of replacement of fossil fuel by the collected biogas will not be counted as emission reduction for the purpose of the conservativeness.

There are xx pigs at xx farmers within the Dominican Republic contributing xx tCO2e/year of greenhouse gas emission. This proposed PoA aims to install anaerobic digesters to xx % of the swine farms in the country, which will result in xx tCO2e/year of greenhouse gas emission reduction.

The coordinating/managing entity (hereafter CME) of this proposed PoA is XXX, which is XXX *[#Please describe the name of the organization and its characteristics]*. Neither the National Government nor the Provincial Governments mandate any quantitative targets for the installation of anaerobic digester at swine industry in the Dominican Republic, and hence, the proposed project activity is a voluntary action that is not required by law/regulation in the country.

A.2.2. Stated goals of the Programmatic CDM and Contribution to Sustainable Development

The goals of the PoA are to contribute sustainable development and achieve public interest objectives of the country. The proposed PoA is designed to "co-benefit" both the global environmental aim to reduce greenhouse gas emissions, as well as the mitigation of local environmental problems including water pollution. Especially, water polluting problem by the waste from swine farm industry has been causing serious negative impacts on the surrounding communities in the country. However, due to the lack of the financial incentives for the farm owners, it has been extremely difficult to find solutions to improve the waste treatment system of the industry. Implementation of this proposed PoA will, therefore, contributes to sustainable development in the Dominican Republic by bringing about the following economic, social and environmental benefits:

Environmental Benefits

The proposed Programmatic CDM project contributes to the following environmental benefits by installation of the anaerobic fermentation digesters at swine farm industry.

- Reduction of greenhouse gas emissions
- Reduction of environmental negative impacts of swine farm industry in the country such as water contamination and odor problems through introduction of anaerobic digester which prevents infiltration of groundwater and enhances decomposition of organic material in wastewater.
- In the case where biogas utilization is applied, emissions of air pollutants (SOx, Nox) will be reduced through replacing conventional fossil fuel used for heat generation

Economic/Social Benefits

- Enhancement of private investments including foreign investment to the local economy:
  Investment by private companies including foreign investment for the implementation of the proposed PoA will contribute to the local economy.
- Creation of job opportunities:
  New jobs may be created by this proposed PoA in the fields of operation and maintenance of the power generation facilities.
- Decrease of dependency on imported fossil fuel and increase the energy security of the country:
  The Dominican Republic is heavily depending on imported fuel and the Government decided to promote renewable energy to increase energy self-sufficiency and diversity of the energy sources of the country.

Technological Benefits

- The XX as a CME of the Program aims to provide the technological support to swine farmers in the country to ensure the farmers to adopt and operate the new facilities and equipments as well as the existing facilities in a appropriate manner.

A.3. Coordinating/managing entity and participants of SSC-POA:

3. Coordinating or managing entity of the PoA as the entity which communicates with the Board

   XXX *[#name of the organization taking role of CME]*

4. Project participants being registered in relation to the PoA

Table 1. Project Participants

Name of Party Involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of the Dominican Republic	XXX	No
XXX *[#Government of investing country]*	XXX	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

The Dominican Republic

A.4.1.2. Physical/ Geographical boundary:

The boundary of the PoA is defined within the Dominican Republic, which is one of the Caribbean countries. The Dominican Republic is the second largest Caribbean nation, with 48,442 km^2 and an estimated 10 million people.

Figure 1. Location of the Dominican Republic

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

As indicated in A.4.2.2, the maximum emission reduction amount shall be less than or equal to 60kt CO2 equivalent annually. Technologies applied in the CPAs under this PoA includes:

- Anaerobic digester to collect biogas from the waste treatment system at swine farm industry,
- A system to combust the collected biogas

1) Anaerobic Digester to collect biogas

The technology that is applied in this proposed PoA is the XXX*[#name of the technology if only particular technology is applicable to the PoA]*. The residue after anaerobic fermentation is to be used as

a liquid fertilizer for soil application or irrigation purpose. The project participants shall ensure that the residue will be treated in aerobic manner.

Picture

[#Image of the technology applicable to the PoA]
Figure 2. Images of Anaerobic Digester for Biogas Collection to Be Applied under the PoA

Below are the technological characteristics of the anaerobic digester to be installed under the PoA *[#please list up the characteristics of the applied technology]*

(vi) Covered digester to collect biogas and connected to combustion system;
(vii) Mesophilic fermentation technology which does not require any electric power or heat for its operation;
(viii) Hydraulic retention time of the digester is designed for more than XXX days; and
(ix) …

2) A system to combust the collected biogas
The collected biogas can be either combusted by flare system or converting into thermal energy mainly for cooking purpose. However, even in the case where the biogas is utilized as thermal energy, the emission reduction by replacement of fossil fuel will not be included in emission reduction calculation for conservativeness purpose.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

The proposed PoA defines the following criteria for inclusion of a project activity as a CPA under the PoA.

<General>
- Located within the Dominican Republic.
- The maximum amount of emission reduction amount shall be less than or equal to 60kt CO2 equivalent annually.

<Baseline>
- The pig population in the farm is managed under confined conditions;
- Manure or the streams obtained after treatment are not discharged into natural water resources (e.g., river or estuaries);
- The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C;
- In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than 1 month;
- Baseline waste treatment system is anaerobic lagoons with at least 1 m depth;
- No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.

<Project activity>

- The anaerobic digester specified in A.4.2.1. is used to collect biogas.
- Monitors and collects appropriate data on the parameters listed in A.4.4.2
- The final sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures (not resulting in methane emissions) must be ensured;
- Flare system and/or biogas utilization measures shall be used to ensure that all biogas produced by the digester combusted;
- The storage time of the manure after removal from the pig barns, including transportation, should not exceed 5 days before being fed into the anaerobic digester.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

The proposed PoA is a voluntary coordinated action as explained in A.2.1.

The current waste management system of swine farms eligible to this PoA is an uncovered anaerobic lagoon system not discharging the water into natural water resources. The proposed project activity is to replace the current system by anaerobic digester to collect biogas from the waste together with a flare system to combust the collected biogas. In addition, if there is thermal energy demand, the biogas may be used on site using appropriate technical measures.

There is no national laws/regulations in the Dominican Republic regarding the operation of the swine farm that swine farmers must, however, there is no national/local regulation mandating the introduction of biogas digester at swine farm industry in the country. The current practise at swine farm industry is in accordance with national and local laws and regulations, and hence there is no obligation for the farmers to convert the current practice into the proposed project activity. Therefore, the project activity is a voluntary action by the CME, XXX *[#Name of the CME]*.

In addition, the Dominican Government promotes to develop and implement renewable energy including biogas utilization activities through “Incentive to Renewable Energy and Special Regimes (Law 57-07)”. The Government has set a target to increase renewable energy utilization ratio upto:

- 25% of the total energy needs by 2025, and
- 10% of the energy purchased by the distribution companies by 2015.

Despite of the above renewable energy policies, there are very few biogas collection and utilization facilities in the country due to the barriers, as indicated in E.5.1. Furthermore, the government legislation indicated above neither mandates biogas collection and utilization activities to be implemented, nor provides legal incentives to overcome the economic and technological challenges of such activities. For these reasons, biogas collection and utilization and combustion/utilization at swine farm industry is unlikely to occur in the absence of the proposed PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The following operational and management arrangements will be implemented by the CME for the implementation of the PoA:

Table 2. Operational and Management Items and Responsible Entities

	Item	Responsible entity	Remarks
1	Operation of the facilities	Project proponents (farmers)	· CME will provide the technical support
2	Maintenance of Equipments	Project proponents (farmers)	· CME will provide the technical support
3	Monitoring	Project proponents (farmers)	· CME will provide technical support
4	Data record	CME	· All data is stored digitally and kept by record keeping system.
5	Identification of each CPA	CME	· Identification number is issued for each CPA. · In order to avoid double-counting and manipulation each CPA will be identical based on: a) the issued number b) CPA name, and c) geographic data.

(v) A record keeping system for each CPA under PoA

Regular monitoring and recording of specific parameters are carried out by individual CPAs. The CME is responsible for collecting, storing and analyzing the data from all CPAs where they will closely monitor the progress of each CPA as well as provide necessary technical assistance.

All the data will be digitally recorded and properly managed under the Record keeping system to ensure double-counting and manipulation would not be occurred. The system keeps all the monitoring data described in A.4.4.2 and project proponents have access to the data of their facility for their reference.

Figure 2 illustrates the flow of the record keeping system while Figure 3 shows the general management system the system.

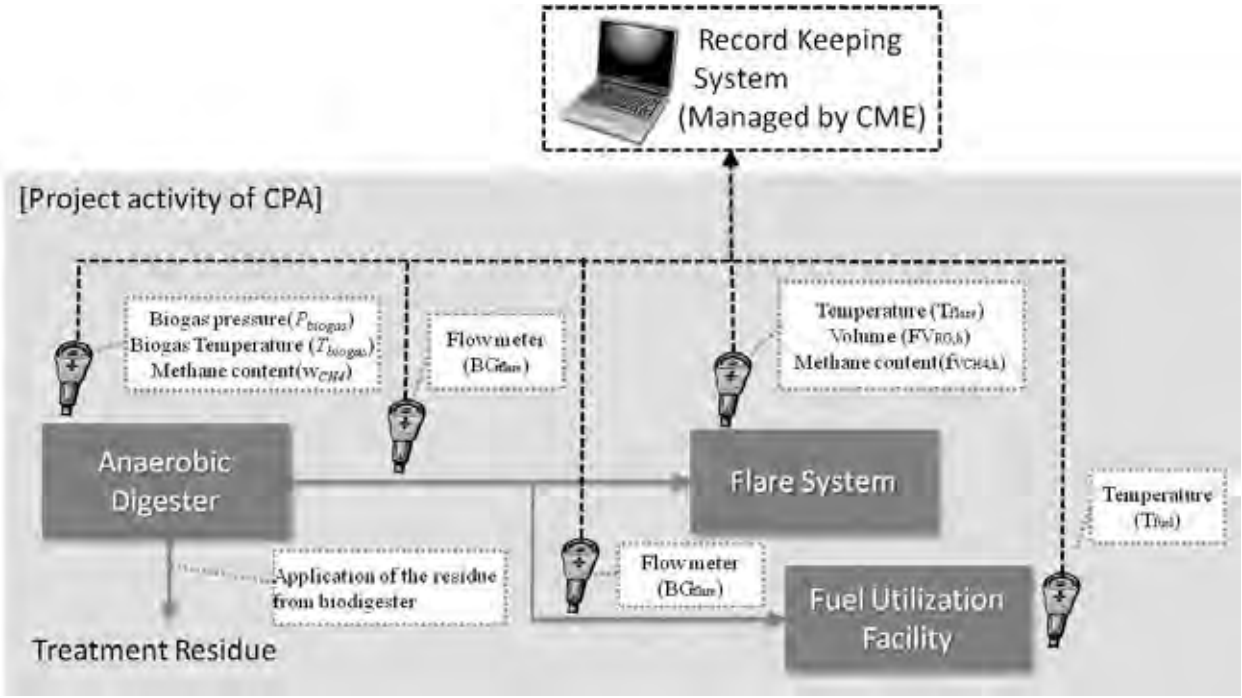


Figure 2. Record Keeping System

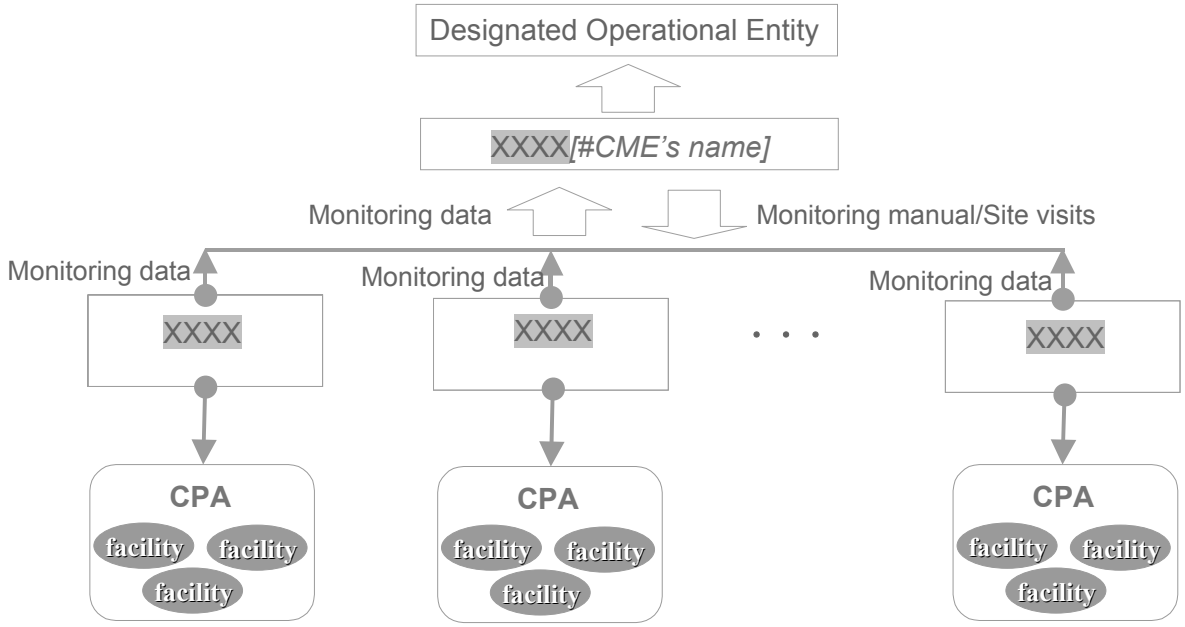


Figure3. Layout of Record Keeping System

(vi) A system/procedure to avoid double counting

An identification system is implemented where numbers will be issued to each CPA based on the geographic location information. These CPA identification numbers are managed by the XXX(CME) who will be responsible for the record keeping system to prevent double-counting and any manipulation.

(vii) Verification that SSC-CPA is not a debunlded component of another CPA

Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities defines that a registered SSC-CPA shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

If the CPA is managed by project participants that are only taking part in one CPA, it can be inferred that the CPA does not have the same project participants with any other CPAs (first criteria), thus verifying that the CPA is not a debulded component of another CPA.

If the CPA is managed by project participants that are taking part in more than one CPAs, the CPA will verify within their CDM-SSC-CPA-DD that one or more of the above criteria for debundling are not met.

Finally, if the CPA meets all four of the criteria for debunlding, it will indicate within their CDM-SSC-CPA-DD that the CPA is the small-scale project activity "both reduce anthropogenic emissions by sources and directly emit less than 60 kilotonnes of carbon dioxide equivalent annually" as stated in paragraph 6 (c) of the decision 17/CP.7. This is in concurrence with Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, which states that, "if a proposed small-scale project activity is deemed to be a debundled component, but the total size of such an activity combined with the previous registered small-scale CDM project activity does not exceed the limits for small-scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7, the project activity can qualify to use simplified modalities and procedures for small-scale CDM project activities."

(viii) Assurance that CPA operations/operators are being subscribed to the PoA

All CPA operations/operators will be assured to be subscribed to the PoA and the subscribed electronic data will be managed by XXX*[#Name of the CME]*.

A.4.4.2. Monitoring plan:

The overview of the data recording system is described in A.4.4.1., XXX*[#Name of the CME]* as the CME, will closely manage the collected data. In addition, the CME will assist the monitoring process at the CPA level by distributing monitoring manuals and necessary forms for data recording to CPAs, as well as making regular site visits to provide any necessary assistance and advice to the CPAs.

Monitoring data will be stored and managed in digital format, which will assure transparency through enabling easy access to the status of CPAs at anytime, as well as preventing double counting and manipulation.

Further information on the monitoring items will be described in Section E.

A.4.5. Public funding of the programme of activities (PoA):

No public funding is involved in this PoA and related CPAs and also this PoA does not include any diversion of ODA funds. *[#if any ODA fund is not involved in the project]*

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

dd/mm/ 2010

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

3. Environmental Analysis is done at PoA level ☐
4. Environmental Analysis is done at SSC-CPA level ☒

According to the "Environmental Impact Evaluation Procedure" by the Secretariat of State for the environment and natural resources, in the Dominican Republic, if a CPA does not utilize the collected biogas, Environmental Impact Assessment will not be required, however, it is required for the case where the project aims to utilize the collected biogas for thermal use. The necessary documents will be depending on the location of the project to be implemented.

Environmental analysis, therefore, needs to be done at SSC-CPA level rather than PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The legal framework of the procedure of Environmental Impact Assessment in the Dominican Republic is given in Law 64-00 on the Environment and Natural Resources, specifically Articles 9, 17, 18, 38 to 48, 107, 109, 150 and 175, as well as the Regulation of the System on Environmental Permits and Licenses, approved by the Secretariat of State for the Environment and Natural Resources.

According to the categories classified in C.3., for Environmental Impact Declaration, the Environmental Impact Declaration Form (SGA-EIA-FOR-002) will be used. Also all categories of projects should comply with the requirement of Public Consultation established in Law 64-00, the Regulation and the Procedure.

In the case Environmental Impact Study or complementary environmental studies are required, the Directorate of Environmental Evaluation will determine the TOR that will serve to guide the corresponding studies. When pertinent, the Ministry of Environment and Natural Resources can request

the project proponent to submit a proposal for TOR, which will serve as basis for the definitive TOR of the project.

There is no transboundary impact is expected by CPAs under the PoA since this project is only applicable to the site where the waste is not discharged into natural water resources, and no air pollutants are expected to be emitted by combusting/flaring biogas collected by the project activity. Also there is no specific documentation required regarding transboundary impacts.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

A typical CPA under the proposed PoA does not utilize the collected biogas for thermal purpose, which is not required to conduct Environmental Impact Study as described in C.1.

However, in the case where the collected biogas is used for thermal usage, according to the "Environmental Impact Evaluation Procedure" by Secretariat of State for the Environment and Natural Resources, in the Dominican Republic, the proposed project activity is categorised as "Waste-to-Energy facility" project which is classified in Category B that is expected to have "limited influence to the area".

If projects classified in Category B is located in a place with very high or high fragility, Environmental Impact Study is required, however if the project location is considered as moderate or low fragility site, Environmental Impact Study is not required as shown in the Table 3. However, as all project sites under this PoA are situated within the geological boundary of the existing swine farms, projects are most likely situated in moderate or low fragility sites.

Table 3. Necessary document for Projects under Category B

Necessary document by category	Fragility Index of the Project Site			
	Very High	High	Moderate	Low
Environmental Impact Study	✓	✓	-	-
Environmental Impact Declaration	-	-	✓*	✓*

*: Depending on the necessity, supplementary Environmental Study, defined based on the revision of the corresponding Environmental Impact Declaration, may be required.

Environmental Impact Study is defined as a set of technical and scientific activities for the identification, prediction and control of environmental impacts of a project and its alternatives, presented as technical report and conducted according to criteria established by rules in force. It is an interdisciplinary and replicable study, and includes measures to prevent, mitigate and/or compensate the identified impacts, establishing the management and adaptation program that is needed for the project implementation, including the monitoring plan as well.

Environmental Impact Declaration is the document resulting from the analysis of a proposed action, from the viewpoints of its effect on the environment and the natural resources, where positive and negative effects are stated, as well as the measures needed for mitigation, prevention or compensation; establishing the Program for the Environmental Management and Adaptation. This document serves as basis for the evaluation of those projects with well known impacts that do not require more detailed environmental studies.

Complementary Environmental Study is the study required by the Ministry of Environment and Natural Resources to complete the identification and analysis of the impacts of a project, work or activity, in reference to specific issues of special interest by laws/regulations of the country.

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

3. Local stakeholder consultation is done at PoA level ☒
4. Local stakeholder consultation is done at SSC-CPA level ☒

[# The following description is an example]
Prior to the implementation of the project activity, interviews were held for the purpose of explaining the objectives, processes, implications and benefits for sustainable development of the PoA to relevant stakeholders, including the representatives from the National Agencies, Financial Institution, environmental NGOs, etc. Further stakeholders' comments, especially at the CPA levels must be collected through interviews with local agencies and citizens who are specifically related to the CPAs.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

[# The following description is an example]
Public comments were collected by individual interviews from the following organizations during the period between XX and XX 2010.

- National Agencies: Ministry of Environment and Natural Resources, XXX, XXX
- Industry association: COOPCIBAO, Asociacion de Porcicultores de Licey al Medio (APORLI)
- Environmental NGO: XXX, XXX
- International aid agencies: United Nations Development Programme, XXX, XXX
- Financial Institution: XXX, XXX

As described in D.1., comments from responsible persons of local agencies and citizens who are specifically related to the proposed project activity will be gathered at a later date through interviews at the CPA level.

D.3. Summary of the comments received:

[# The following description is an example]
Interviewees were generally very supportive towards the implementation of the PoA, viewing it as a positive opportunity for the Dominican Republic to gain the technological and financial support from XXX *[#investing country]* in order to improve water quality surrounding the areas by introduction of digester to recover biogas and, in some cases, to shift its energy supply to from fossil fuel base into renewable sources by utilizing the biogas collected by the activity, as well as create opportunities to provide positive impacts to rural agricultural communities. Moreover, no direct objections to the implementation of the proposed PoA were expressed during or after the interviews and public comments.

D.4. Report on how due account was taken of any comments received:

All clarifications requested by local attending stakeholders were addressed during the discussion.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

SSC AMS-III.D. "Methane recovery in animal manure management systems (ver.16)" is applied to the baseline and monitoring methodologies in the PoA. Methodological Tool in Annex 13 of the EB 28 meeting Report: "Tool to determine project emissions from flaring gases containing methane" is also applied as references for SSC AMS-III.D (ver.16).

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

This PoA applies SSC AMS-III.D (ver.16). The applicability criteria of the applied methodology are described in Table 4, which need to be checked and justified at each CPA level.

Table 4. Applicability Criteria and Justification

Applicability Criteria of SSC AMS-III.D (ver.16)	Justification of Applicability
6. The livestock population in the farm is managed under confined conditions.	Needs to be justified at the CPA level.
7. Manure or the streams obtained after treatment are not discharged into natural water resources (e.g., river or estuaries).	Needs to be justified at the CPA level.
8. The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C.	The average temperature of the Dominican Republic is 25°C (average minimum 21°C, average maximum 31°C), which is far beyond 5°C[7]. Even the lowest regional average minimum temperature is even 19°C. Therefore this criterion is satisfied for the CPAs under the PoA.
9. In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than 1 month, and in case of anaerobic lagoons in the baseline, their depths are at least 1 m.	Needs to be justified at the CPA level.
10. No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	Needs to be justified at the CPA level.

[7] BBC whether (also cross checked by the data from the Oficina de Medico(ONAMET) of observation stations)

E.3. Description of the sources and gases included in the SSC-CPA boundary

The boundary applied to each CPA under the PoA is physical, geographical site of the livestock and manure generation and management systems, and the facilities which recover and flare/combust or use methane.

The project activity emissions included within the project boundary are emissions that occurred due to the project activity and are shown below (Refer to Table10. Items to Be Counted as Project Emission):

i) Physical leakage of biogas in the manure management systems which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$).
ii) Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$)

The baseline emissions included in the project boundary is as follows:

i) Methane (CH4) emission from generated manure which is left to decay anaerobically.

All the manure management system within the project boundary is to be affected by the project activity while the manure generation system is not affected.

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario for this PoA is the situation where, in the absence of the project activity, swine waste is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. In addition, onsite thermal need is satisfied by fossil fuel origin energy. The baseline scenario treatment system is characterized by low investment costs, low levels of management requirement, however, poor environmental safeguards and high rates of greenhouse gas emission, especially methane.

Table 5 explains how the important parameters of baseline emission reduction are determined.

Table 5. Monitored Parameters

Monitoring Item	Unit	Figure	Remarks
Annual methane conversion factor (MCF) for the baseline animal waste management system j (MCFj)	-	78%~80% depending on the project location,	Default value for anaerobic open lagoon as per "revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 10A-7, pg 10.80" Anaerobic lagoon system is the most dominant system for swine farm waste treatment system in the Dominican Republic. Refer to E.6.2.(1) Step1-3.

Volatile solids for swine entering the manure management system in year y (VLT,y)	kg_dry /animal/ year	Site specific figure	Adjusted volatile solid excretion per day on dry-matter basis for defined livestock population at each CPA site, in kg_{-dm}/ animal. IPCC default values are based on an average weight of 28kg of the market and breeding swine. In order to obtain a representative figure, the IPCC default value for Volatile Solids is corrected as follows: $VS_{site} = (W_{site}/W_{default}) \times VS_{default}$ Where: VS_{site}: Adjusted volatile solid excretion per day on dry-matter basis for defined livestock population at project site, in kg-dm/animal. W_{site}: Average site animal weight for defined population, in kg. $W_{default}$: Default average animal weight for defined population (28kg for market and breeding swine in Latin Amaerica). $VS_{default}$: Default value (IPCC) for the volatile solid excretion per day on a dry-matter basis for defined livestock population, 0.3 kg_{-dm}/animal.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

In the absence of the PoA, biogas recovery from swine farm waste (proposed project activity) will not be implemented due to the existence of the following barriers, thus greenhouse gases will continue to be emitted into the atmosphere through anaerobic decaying process of the swine waste.

Determination of additionality will be established in line with Attachment A of Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities. The project participants will provide an explanation to show that the project activity would not have occurred without the PoA, due to at least one of the following barriers: investment barrier, technology barrier, barrier due to prevailing practice and other barriers.

For a typical CPA under this PoA will be applicable to the following barriers:

E.5.1 Barrier Study
The alternative baseline scenarios to a typical CPA under this PoA are identified as follows:

Alternative 1:
Manure is treated by aerobic treatment technology (by activated sludge or filter bed type treatment);

Alternative 2:
Biogas is collected through anaerobic digester. The collected biogas is combusted with/without usage for thermal purpose (Proposed project); and

Alternative3:
Scenario of continuity of the current practice (Baseline scenario).

E.5.2.1) Investment barrier
a) Investment category for each scenario

a.1) Alternative 1 of aerobic treatment (activated sludge or filter bed type treatment) is superior to the current practice (alternative 1) in a processing function. However, aerobic treatment uses much electricity for aeration device, and the amount of sludge will also increase causing new problem. In addition, this is higher in cost compared to conventional systems, and there is no source of income.

a.2) Alternative 2 of anaerobic processing digester has appropriate systems that can control, accelerate and capture methane emissions arising in the process for thermal usage, which can save cost of the famers who own the facility. However due to the high cost of the system, the system is not financially viable without CER trading for this proposed project as described in a.2).

a.3) Alternative 3, this technology is already installed and further investment is not required.

Therefore, out of the three alternative scenarios above, Alternative 1 and Alternative 2 are unlikely to be the baseline scenario. Therefore, the practical and feasible baseline scenario is Alternative 3, which is the uncovered anaerobic lagoon system. At this scenario, generated biogas continues to be emitted to the atmosphere without recovery.

E.5.2.2) Technology barrier
The technology applied in CPAs under the PoA is a sealed biogas digester using mesophilic anaerobic fermentation technology. To this day, there are very few cases of the technology installed in the Dominican Republic without technical assistance by international donor agencies. In addition, manufacturing and maintenance capacity of this technology is limited. These situations are causing a technology barrier to apply the technology especially for small farmers who have little access to the financial and technical assistance to install and maintain the technology unless the support provided by the CME under the PoA.

E.5.2.3) Barrier due to prevailing practice
The most swine farms are using anaerobic open lagoon system for waste treatment in the Dominican Republic and only very few swine farms apply biogas recovery and utilization system. In addition, the most facilities applying biogas recovery system receive a grant fund and technical assistance from international donor agencies. Therefore, there is a barrier due to prevailing practice.

E.5.2.4) Other barriers: Access-to-finance barrier
Due to the small-scale nature of recovering biogas from swine farm waste treatment and utilization system, procurement of funds from financing banks without CDM is extremely challenging. The project activity cannot access appropriate capital without being implemented under the CDM scheme since implementation as the CDM project is the crucial factor for some financing banks to approve the loan.

E.5.2.5) Legal Barrier
As described in A.4.3., the current practice of the waste treatment system at swine industry in the

Dominican Republic is in accordance with the existing laws and regulations of the country, and there is no mandate or incentive for swine farmers to implement the proposed project activity in the Dominican Republic, which causes legal barrier for the implementation of the proposed project activity.

E.5.2.6) Impact of CDM registration

CDM registration will enable CPAs to receive low-income loans from a financial institution. In addition, the approval and registration of the CDM project will alleviate the identified barriers through diversion of some risks in the project to the CDM partner. Moreover, additional revenue from CER sales, technology transfer and investment from countries will allow the XXX to finance and implement the proposed project activities.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Below are the key criteria for assessing the additionality of the CPA to be included in the registered PoA.

- Technology barrier: The applied mesophilic anaerobic fermentation digester technology is an advanced technology that has not been implemented in the Dominican Republic without technical and financial assistance by international donor agencies and manufacturing and maintenance capacity of this particular technology is limited in the country.
- Barrier to prevailing practice: Dominant numbers of the swine farms in the country apply uncovered anaerobic lagoon system and very few farms have applied biogas recovery activity in their farm.
- Legal barrier: There is no law/regulation mandating or providing incentives for swine farmers to implement the proposed project activity in the Dominican Republic
- Other barrier: Access-to-finance barrier: A statement from the financing bank that the implementation as the CDM is critical in the approval of the loan.

CPA under PoA must meet at least one of the above criteria to meet the additionality requirement.

E.6. Estimation of emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Baseline emissions and project emissions are calculated by the equations defined by SSC AMS-III.D. "Methane recovery in animal manure management systems (ver.16)". The parameters used for calculation are locally obtained values and default values determined by IPCC Guidelines for National Greenhouse Gas Inventories (2006).

Methodological Tool in Annex 13 of the EB 28 meeting Report: "Tool to determine project emissions from flaring gases containing methane" is also applied as references for SSC AMS-III.D (ver.16) (referring to equation (1) in E.6.2.).

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

(1) Baseline Emissions

Based on SSC AMS-III.D., baseline emissions are obtained by the following steps:

Step1-1. Baseline Emission Calculation

Baseline emissions (BEy) are calculated using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity in accordance with the most recent IPCC tier 2 approach. Values for manure characteristics including the amount of volatile solids (VS) produced by the livestock and the maximum amount of methane that can be potentially produced from that manure (Bo) should be selected based on 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Baseline emissions are determined as follows:

$$BE_y = GWP_{CH4} * D_{CH4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{Bl,j} \quad \text{.....(1)}$$

Where:

BE_y Baseline emissions in year *y* (tCO2e)
GWP_{CH4} Global Warming Potential (GWP) of CH4 (21)
D_{CH4} CH4 density (0.00067 t/m3 at room temperature (20 ºC) and 1 atm pressure)
LT Index for all types of livestock (market swine and breeding swine)
j Index for animal waste management system
MCF_j Annual methane conversion factor for the baseline animal waste management system j
$B_{0,LT}$ Maximum methane producing potential of the volatile solid generated for animal type "LT" (m3 CH4/kg dm)
$N_{LT,y}$ Annual average number of animals of type "LT" in year *y* (numbers)
$VS_{LT,y}$ Volatile solids for livestock "LT" entering the animal manure management system in year *y* (on a dry matter weight basis, kg dm/animal/year)
$MS\%_{Bl,j}$ Fraction of manure handled in baseline animal manure management system *j*
UF_b Model correction factor to account for model uncertainties (0.94)[1]

Table 6 Parameters Necessary for Determination of Baseline Emission (BE_y)

Data/Parameter[8]	Variables	Value	Unit	Source/Reference
Global Warming Potential of CH_4	GWP_{CH4}	21	-	IPCC 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, pg. 26
CH4 density (at room temperature (20 °C) and 1 atm pressure)	D_{CH4}	0.00067	t/m^3	SSC AMS-III.D(ver.16)

[8] The value of any data and parameters are the numbers or figures that are available at the time of validation.

Data/Parameter[8]	Variables	Value	Unit	Source/Reference
Index for all types of livestock	*LT*	Swine	-	Market swine and breeding swine based on the category defined in 2006 IPCC Guidelines
Index for animal waste management system	*j*	Uncovered anaerobic lagoon	-	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10.17
Annual methane conversion factor for the baseline animal waste management system *j*	MCF	78~80% depending on CPA's location	-	E.6.2.(1) Step1-2
Maximum methane producing potential of the volatile solid generated for animal type "LT"	$B_{0,LT}$	0.29	m^3 CH_4/kg $_{dm}$	E.6.2.(1) Step1-3
Annual average number of animals of type "LT" in year *y*	$N_{LT,y}$	-	numbers	Site specific data
Volatile solids for livestock "LT" entering the animal manure management system in year y	$VS_{LT,}$	-	kg $_{dm}$/ animal/year	E.6.2.(1) Step1-4
Fraction of manure handled in system i in year y	$MS\%_{i,y}$	1.0	-	Site specific data
Model correction factor to account for model uncertainties	UF_b	0.94	-	SSC AMS-III.D.(Ver16)

Step 1-2. Determination of methane conversion factor (MCF)

Methane Conversion Factors (MCF) values are determined for a specific manure management system and represent the degree to which Bo is achieved. Where available country specific MCF values that reflect the specific management systems used in particular countries or regions shall be used. Such value, however, is not available in the Dominican Republic, IPCC default values provided in table 10.17 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 will be used based on the average temperature of the country which is 25 °C (Average minimum 21°C, Average maximum 30°C[9]). If there is no temperature data available in the area, for the purpose of conservativeness, 77%, the minimum value, is to be applied.

Table 7 Parameters Necessary for Determination of Methane Conversion Factor (MCF)

Data/Parameter[10]	Variables	Value	Unit	Source/Reference

[9] BBC whether (also cross checked by the data from the Oficina de Medico(ONAMET) of observation stations)
[10] The value of any data and parameters are the numbers or figures that are available at the time of validation.

Data/Parameter[10]	Variables	Value	Unit	Source/Reference
Methane conversion factor for CPAs in the area where average temperature is below 18~19 °C	MCF	77	%	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Methane conversion factor for CPAs in the area where average temperature is below 20~22 °C		78	%	
Methane conversion factor for CPAs in the area where average temperature is between 23~26 °C		79	%	
Methane conversion factor for CPAs in the area where average temperature is beyond 27 °C		80	%	

Step 1-3. Determination of maximum methane producing potential (Bo) of the volatile solid generated for animal type "LT"

The maximum methane-producing capacity of the manure (Bo) varies by species and diet. In case of the Dominican Republic, country specific Bo value is not available, and hence, default value for market swine and breeding swine in Latin America provided in 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8 shown below is to be applied.

$B_0 = 0.29\ m^3CH_4/kg_{\_VS}$ .....(2)

This value is applied to all the CPAs as only swine farms are eligible to this PoA.

Step 1-4. Determination of volatile solids (VS)

Volatile solids (VS) are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. The preferred method to obtain VS is to use data from nationally published sources. However, as country specific data such as VS excretion or feed intake is not available in the Dominican Republic, IPCC default values provided in 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10, which is 0.3 kg dm/animal/day, will be used.
However, in case any CPA wishes to adjust the default IPCC values for VS for a site-specific average animal weight, it shall be well explained and documented based on the following equation:

$$VS_{LT,y} = \frac{W_{site}}{W_{default}} * VS_{default} * nd_y \qquad .....(3)$$

Where:

W_{site} Average animal weight of a defined livestock population at the project site (kg)

$W_{default}$ Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)

$VS_{default}$ Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg dm/animal/day)

nd_y Number of days in year *y* where the treatment plant was operational

Table 8 Parameters Necessary for Determination of Volatile Solids ($VS_{LT,y}$)

Data/Parameter[11]	Variables	Value	Unit	Source/Reference
Average animal weight of a defined livestock population at the project site	W_{site}	0.3	kg	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Default average animal weight of a defined population	$W_{default}$	28	kg	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population	$VS_{default}$	0.3	kg $_{dm}$/ animal/day	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Number of days in year *y* where the treatment plant was operational	nd_y		numbers	Site specific data

In case of sequential treatment stages, the reduction of the volatile solids during a treatment stage is estimated based on referenced data for different treatment types. Emissions from the next treatment stage are then calculated following the approach outlined above, but with volatile solids adjusted for the reduction from the previous treatment stages by multiplying by (1 - RVS), where RVS is the relative reduction of volatile solids from the previous stage. The relative reduction (RVS) of volatile solids depends on the treatment technology and should be estimated in a conservative manner. Default values for different treatment technologies can be found in the table in annex 1 of SSC AMS-III.D.(Ver.16).

Step 1-4. Determination of annual average number of animals ($N_{L,T,y}$)

The annual average number of animals ($N_{LT,y}$) are determined as follows:

Where:

$N_{da,y}$ Number of days animal is alive in the farm in the year *y* (numbers)
$N_{p,y}$ Number of animals produced annually of type *LT* for the year *y* (numbers)

Table 9 Parameters Necessary for Determination of Annual Average Number of Animals ($N_{L,T,y}$)

Data/Parameter [12]	Variables	Value	Unit	Source/Reference
Number of days animal is alive in the farm in the year *y*	$N_{da,y}$	CPA site specific data	numbers	Public statistics/official data
Number of animals produced annually of	$N_{p,y}$	CPA site specific data	numbers	Public statistics/official data

[11] The value of any data and parameters are the numbers or figures that are available at the time of validation.
[12] The value of any data and parameters are the numbers or figures that are available at the time of validation.

Data/Parameter [12]	Variables	Value	Unit	Source/Reference
type *LT* for the year *y*				

(2) Project Emissions

Step 2-1. Project Emission Calculation (PE_y)

Project emissions of the project activities under the PoA can be calculated based on the following equation.

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{storage,y} \quad \text{.....(4)}$$

Where:
PE: Project emissions in year *y* (tCO2e)
$PE_{PL\,y}$: Emissions due to physical leakage of biogas in year *y* (tCO2e)
$PE_{flare\,y}$: Emissions from flaring or combustion of the biogas stream in the year *y* (tCO2e)
$PE_{power\,y}$: Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year *y* (tCO2e)
$PE_{storage,\,y}$: Emissions from the storage of manure (tCO2e)

The project activity involves the PE_y in the project emissions as described in the Table 10:

Table 10 Items to Be Counted as Project Emission (PE_y)

Item		Item to be counted	Description
a)	$PE_{PL\,y}$	✓	To be accounted in the emission calculation.
b)	$PE_{flare\,y}$	✓	To be accounted as at all CPAs, the collected biogas will be combusted by open flare system.
c)	$PE_{power\,y}$		Not included in the calculation as any fossil fuel or electronic power is expected to be used for new facilities to be installed by the proposed project activity.
d)	$PE_{storage,\,y}$		Not included in the calculation as the manure will not be stored more than Methane emissions from degradable organic carbon in treated wastewater is not accounted for as the project activity does not discharge any wastewater into sea/river/lake.

Step 2-2. Emissions due to physical leakage of biogas ($PE_{PL,y}$)

Project emissions due to physical leakage of biogas from the animal manure management systems used to produce, collect and transport the biogas to the point of flaring or gainful use is estimated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity2, as follows:

$$PE_y = 0.10 * GWP_{CH4} * D_{CH4} * \sum_{j,LT} B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{i,y} \quad \text{.....(5)}$$

Where:

$MS\%_{i,y}$:Fraction of manure handled in system *i* in year *y*
PE_y :Project emissions in year *y* (tCO2e)
GWP_{CH4} :Global Warming Potential (GWP) of CH_4 (21)
D_{CH4} :CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure)
LT :Index for all types of livestock
j :Index for animal waste management system
$B_{0,LT}$:Maximum methane producing potential of the volatile solid generated for animal type "LT" (m^3 CH_4/kg $_{dm}$)
$N_{LT,y}$:Annual average number of animals of type "LT" in year *y* (numbers)
$VS_{LT,y}$:Volatile solids for livestock "LT" entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal/year)

Table 11 Parameters Necessary for Determination of Project Emissions due to Physical Leakage of Biogas ($PE_{PL,y}$)

Data/Parameter[13]	Variables	Value	Unit	Source/Reference
Fraction of manure handled in system *i* in year *y*	$MS\%_{i,y}$	1.0	-	Site specific data
Global Warming Potential (GWP) of CH_4	GWP_{CH4}	21	-	IPCC 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, pg. 26
CH_4 density (at room temperature (20 °C) and 1 atm pressure)	D_{CH4}	0.00067	t/m^3	SSC AMS-III.D(ver.16)
Index for all types of livestock	LT	Swine	-	Market swine and breeding swine defined in 2006 IPCC Guidelines
Index for animal waste management system	j	Uncovered anaerobic lagoon	-	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10.17
Maximum methane producing potential of the volatile solid generated for animal type "LT"	$B_{0,LT}$	0.29	m^3 CH_4/ kg $_{dm}$	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Annual average number of animals of type "LT" in year *y* (numbers)	$N_{LT,y}$	-	numbers	Site specific data
Volatile solids for livestock "LT" entering	$VS_{LT,}$	-	kg $_{dm}$/ animal/year	Site specific data obtained by Equation (3)

[13] The value of any data and parameters are the numbers or figures that are available at the time of validation.

Data/Parameter[13]	Variables	Value	Unit	Source/Reference
the animal manure management system in year y				

If the project activity involves sequential manure management systems, the procedure specified in Step1-2 shall be used to estimate the project emissions due to physical leakage of biogas in each stage.

Step 2-3. Emissions from flaring or combustion of the biogas stream ($PE_{flare,y}$)

$PE_{flate,y}$ is emissions by the combustion of the recovered biogas using open flare system. In the project activity, all the biogas to be generated are to be combusted by the gas engine and flare system is expected to be used only in case of emergencies. For the determination of the flare efficiency, the default value of 50% will be used for the calculation of project emissions from flaring gases. In accordance with the "Tool to determine Project emissions from flaring gases containing methane", the Project emissions from flaring gases are calculated as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare,h}) * GWP_{CH4} / 1000 \quad \text{.....(6)}$$

Where:

$PE_{flare,y}$: Project emissions from flaring of the residual gas stream in year *y* (tCO2e)

$TM_{RG,h}$: Mass flow rate of methane in the residual gas in the hour *h* (kg/h)

η_{flare} : Flare efficiency in hour *h* based on measurements or default values (0.5)

GWP_{CH4} : Global Warming Potential of methane valid for the commitment period (tCO2/tCH4)(21)

The mass flow rate of methane in the residual gas is calculated as follows:

$$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n} \quad \text{.....(7)}$$

Where:

$TM_{RG,h}$: Mass flow rate of methane in the residual gas in the hour *h* (kg/h)

$FV_{RG,h}$: Volumetric flow rate of the residual gas in dry basis at normal conditions in hour *h* (Nm^3/h)

$fv_{CH4,RG,h}$: Volumetric fraction of methane in the residual gas on dry basis in hour *h*

$\rho_{CH4,n}$: Density of methane at normal conditions (0.716) (Kg/Nm^3)

Table 12 Parameters Necessary for Determination of Project Emissions from Electricity Consumption ($PE_{flrae,y}$)

Data/Parameter[14]	Variables	Value	Unit	Source/Reference

[14] The value of any data and parameters are the numbers or figures that are available at the time of validation.

Data/Parameter[14]	Variables	Value	Unit	Source/Reference
Flare efficiency in hour *h* based on measurements or default values	η flare	0.5	-	Default value for open flare system provided in the "Tool to determine project emissions from flaring gases containing methane"
Global Warming Potential of methane valid for the commitment period	GWP_{CH4}	21	tCO2e/ tCH4	IPCC 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, pg. 26
Mass flow rate of methane in the residual gas in the hour *h*	$TM_{RG,h}$	0	kg/h	Calculated by Equation 7
Volumetric flow rate of the residual gas in dry basis at normal conditions in hour *h*	$FV_{RG,h}$	-	Nm^3/h	To be monitored
Volumetric fraction of methane in the residual gas on dry basis in hour *h*	$fv_{CH4,RG,h}$	-	-	To be monitored
Density of methane at normal conditions	$\rho_{CH4,n}$	0.716	Kg/Nm^3	Default value provided in the "Tool to determine project emissions from flaring gases containing methane"

(3) Leakage Emissions

No leakage emissions are expected by the project activity.

(4) Estimation of the Emission Reduction

Greenhouse gas emissions reduction is calculated as indicated in Equation (8).

$$\underset{(tCO2e/y)}{ER_{y\_ex\ ante}} = \underset{(tCO2e/y)}{BE_{y\ ex\ ante}} - \left(\underset{(tCO2e/y)}{PE_{y\ ex\ ante}} + \underset{(tCO2e/y)}{Leakage_{y\ ex\ ante}} \right) \quad \text{.....(8)}$$

Where:

$ER_{y\ ex\ ante}$: *Ex ante* emissions reduction in year "y" (tCO2e/y)
$BE_{y\ ex\ ante}$: *Ex ante* baseline emissions in year "y" (tCO2e/y)
$PE_{y\ ex\ ante}$: *Ex ante* project emissions in year "y" (tCO2e/y)
$Leakage_{y\ ex\ ante}$: *Ex ante* emissions due to leakage in year y (tCO2e/y)

According to AMS-III.D., for this project activity, *Ex post* emission reductions shall be determined based on the lowest value of the following:

(i) The amount of biogas recovered and fuelled or flared (MD_y) during the crediting period, that is monitored ex post;

(ii) Ex post calculated baseline, project and leakage emissions based on actual monitored data for the project activity.

The emission reductions achieved by the project activity is limited to the ex post calculated baseline emissions minus project emissions using the actual monitored data for the project activity. The emission reductions achieved in any year are the lowest value of the following:

$$ER_{y,ex\ post} = \min ((BE_{y,\ ex\ post} - PE_{y,ex\ post}),\ (MD_y - PE_{power,\ y,\ ex\ post}) \quad \text{..... } \textit{(Equation 9)}$$

Where:

$ER_{y,ex\ post}$: Emission reductions achieved by the project activity based on monitored values for year y (tCO2e)

$BE_{y,\ ex\ post}$: Baseline emissions calculated as per paragraph 23 of AMS-III.D using ex post monitored values

$PE_{y,ex\ post}$: Project emissions calculated as per paragraph 23 of AMS-III.D using ex post monitored values

$PE_{power,\ y,ex\ post}$: Project emissions calculated as per paragraph 23 of AMS-III.D using ex post monitored values

MD_y: Methane captured and destroyed/gainfully used by the project activity in the year y (tCO2e)

In case of flaring/combustion MD_y will be measured using the conditions of the flaring process:

$$MD_y = (BG_{flare} + BG_{thermal}) * w_{CH4,y} * D_{CH4} * FE * GWP_{CH4} \quad \text{..... } \textit{(Equation 10)}$$

Where:

BG_{flare} : Biogas flared in year y (m^3)

$BG_{thermal}$: Biogas combusted for thermal use in year y (m^3)

$w_{CH4,y}$: Methane content in the biogas in the year y (mass fraction)

D_{CH4}: Density of methane at the temperature and pressure of the biogas in the year y (tonnes/m^3)

FE: Flare efficiency in year y (fraction)

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

The detailed information on the data and parameters not requiring monitoring are described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in E.7.1.

Data / Parameter:	GWP_{CH4}
Data unit:	-
Description:	Global warming potential for methane

Source of data used:	IPCC 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, pg. 26
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	D_{CH4}
Data unit:	Kg/m^3
Description:	CH_4 density (at room temperature (20 °C) and 1 atm pressure)
Source of data used:	SSC AMS-III.D(ver.16)
Value applied:	0.67
Justification of the choice of data or description of measurement methods and procedures actually applied :	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	AMS III.D. Ver.16
Value applied:	0.94
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the AMS IIID, Correction factor will be used for estimation of baseline emissions.
Any comment:	

Data / Parameter:	**MCF**
Data unit:	Fraction
Description:	Methane conversion factor
Source of data used:	IPCC 2006 Guidelines.
Value applied:	76% for a site where the average temperature is between 17°C 77% for a site where the average temperature is between 18-19°C 78% for a site where the average temperature is between 20-22°C 79% for a site where the average temperature is between 23-26°C 80% for a site where the average temperature is above 27°C

Justification of the choice of data or description of measurement methods and procedures actually applied :	The factor MCF is taken from IPCC 2006 Guidelines for the manure management system considered in this PoA. (Volume 4, chapter 10, table 10.17) according to the annual average temperature by region. The temperature information can be derived from 'Office of Meteorology-ONAMET' of the Dominican Republic.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**B_0**
Data unit:	m^3CH_4/kg VS
Description:	Methane production
Source of data used:	IPCC 2006 Guidelines
Value applied:	0.29
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to IPCC 2006 Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10 table 10 A-7 and A-8, default value for market swine and breeding swine in Latin America
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**$N_{LT,y}$**
Data unit:	Number of heads
Description:	Average swine population
Source of data used:	Public statistics/official data source
Value applied:	Determined at the CPA level
Justification of the choice of data or description of measurement methods and procedures actually applied :	The used data will be checked by a specialist of CME
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**$VS_{LT,y}$**
Data unit:	Kg/animal/day
Description:	Volatile solid excretion per animal per day.
Source of data used:	Calculated according to Equation (3) based on IPCC 2006 Guidelines.
Value applied:	Site specific data
Justification of the choice of data or description of measurement methods and procedures actually applied :	$VS_{LT.y}$ is determined by an equation that uses $VS_{default}$ values of the IPCC Guidelines. $VS_{LT.y}$ is separately calculated for breeding swine and market swine.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	MS

Data unit:	%
Description:	Fraction of manure handled in baseline animal manure management system
Source of data used:	Site specific value
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the report made by the farm which will be confirmed by site inspection by CME.
Any comment:	

Data / Parameter:	$VS_{default}$
Data unit:	Kg/animal/day
Description:	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Value applied:	0.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	W_{site}
Data unit:	Kg/head
Description:	Average weight of livestock (market swine and breeding swine)
Source of data used:	Estimated in each site based on the record of the site
Value applied:	Determined at the CPA level
Justification of the choice of data or description of measurement methods and procedures actually applied :	The average weight is determined by specialist of CME based on the procedures determined under the proposed PoA. The figures will be determined for market swine and breeding swine separately.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	$W_{default}$
Data unit:	Kg/head
Description:	Default average animal weight of a defined population
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, Table 10 A-7 and A-8, value for market swine and breeding swine in Latin America
Value applied:	

Justification of the choice of data or description of measurement methods and procedures actually applied :	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	**nd**
Data unit:	Number of days.
Description:	Number of days of the allocation of swine in the farms.
Source of data used:	Quantity of allotment of swine activity in a determined year.
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electronically archived for 2 years.
Any comment:	

Data / Parameter:	η_{flare}
Data unit:	-
Description:	Flare efficiency in hour h based on measurements or default values
Source of data used:	Tool to determine project emissions from flaring gases containing methane
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value for open flare system provided in the "Tool to determine project emissions from flaring gases containing methane".
Any comment:	

Data / Parameter:	$\rho_{CH4,n}$
Data unit:	Kg/Nm^3
Description:	Density of methane at normal conditions
Source of data used:	Tool to determine project emissions from flaring gases containing methane
Value applied:	0.716
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value provided in the "Tool to determine project emissions from flaring gases containing methane".
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**$FV_{RG,h}$**
Data unit:	m^3/h
Description:	Volumetric flow rate of biogas into flare system in dry basis at normal conditions in the hour *h*
Source of data to be used:	Measured using a flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas ($fv_{i,h}$) when the residual gas temperature exceeds 60 ºC continuously. Values to be averaged hourly or at a shorter time interval.
QA/QC procedures to be applied:	Flow meters are to be periodically calibrated according to the manufacturer's recommendation.
Any comment:	

Data / Parameter:	**$fv_{CH4,h}$**
Data unit:	-
Description:	Volumetric fraction of component CH_4 in the residual gas into flare system in the hour *h*
Source of data to be used:	Measured using a continuous gas analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of the volumetric flow rate of the residual gas ($FV_{RG,h}$) when the residual gas temperature exceeds 60 ºC continuously. Values to be averaged hourly or at a shorter time interval.
QA/QC procedures to be applied:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard certified gas.
Any comment:	

Data / Parameter:	**Biogas pressure (P_{biogas})**
Data unit:	Bar
Description:	Pressure of biogas
Source of data to be used:	Onsite technicians/Workers (measured)

Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Electronically measured using pressure transmitter.
QA/QC procedures to be applied:	The pressure gauge will undergo maintenance/ calibration subject to appropriate industry standards.
Any comment:	Used for project emissions.

Data / Parameter:	**Biogas Temperature (T_{biogas})**
Data unit:	°C
Description:	Temperature of biogas
Source of data to be used:	Onsite technicians/Workers (measured)
Value of data	
Description of measurement methods and procedures to be applied:	Electronically measured using thermometer.
QA/QC procedures to be applied:	The thermometer will undergo maintenance/ calibration subject to appropriate industry standards.
Any comment:	

Data / Parameter:	**T_{flare}**
Data unit:	°C
Description:	Temperature of the exhaust gas from flare
Source of data to be used:	Onsite Technicians/Workers (measured)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	≥ 500ºC
Description of measurement methods and procedures to be applied:	Measurement of temperature of the exhaust gas stream in the flare electronically. A temperature above 500 °C indicates that a significant amount of gases are still being burnt and that the flare is operating.
QA/QC procedures to be applied:	The flame detectors are kept serviced as per manufacturer's recommendation as and when required.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**T_{fuel}**

Data unit:	°C
Description:	Temperature of the combustion for thermal use
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	≥ 500ºC
Description of measurement methods and procedures to be applied:	The temperature meter measures the temperature of the exhaust gas for thermal use.
QA/QC procedures to be applied:	The flame detectors are kept serviced as per manufacturer's recommendation as and when required.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**Application of the residue from biodigester**
Data unit:	-
Description:	Application method of the residue from biodigester
Source of data to be used:	Onsite Technicians/Workers (measured)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Onsite check by technicians/workers to ensure aerobic condition of the treatment method of the residue generated by biodigester.
QA/QC procedures to be applied:	Regular site visit by CME at least once a year.
Any comment:	Electronically archived for 2 years.

Data / Parameter:	**BG_{flare}**
Data unit:	m^3
Description:	Biogas flared in year y
Source of data to be used:	Measured by continuous flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	

Description of measurement methods and procedures to be applied:	To be measured continuously and reported cumulatively.
QA/QC procedures to be applied:	Electronically archived during for 2 years.
Any comment:	

Data / Parameter:	**$BG_{thermal}$**
Data unit:	m^3
Description:	Biogas combusted for thermal use in year y
Source of data to be used:	Measured by continuous flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	To be measured continuously and reported cumulatively.
QA/QC procedures to be applied:	Electronically archived during for 2 years.
Any comment:	

Data / Parameter:	**w_{CH4}**
Data unit:	-
Description:	Methane content in the biogas in the year y
Source of data to be used:	Actual measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Electronic on-site continuous analysis. At least quarterly Interval to satisfy statistical 95% confidence level.
QA/QC procedures to be applied:	Sampling is carried out, adhering to internationally recognized procedures.
Any comment:	Electronically archived for 2 years.

E.7.2. Description of the monitoring plan for a SSC-CPA:

Monitoring and reporting framework is shown in Figure 2 and Figure 3. The operation and management of each power generation facilities are carried out by the power producers. Based on a project operation

and monitoring manual, electricity data will be collected, managed, and monitored by the XXX. XXX will undertake data checking, calculation of emission reduction, site visits and provision of advice to the XXX. XXX will also be responsible for communication with Designated Operational Entity for verification procedures (Refer to Figure3. Layout of Record Keeping System).

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

dd/mm/2010

[#Name]
[#Company]
[#Address]
Tel: XXX, Fax:XXX

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.*[# In case where public funding is involve,. please explain any fund from related to ODA is not involved in the project]*

Annex 3

BASELINE INFORMATION

Baseline information is described in Section E.

Annex 4

MONITORING INFORMATION

Refer to Section D. for the Monitoring Information

- - - - -

PDD Modelo 3

Programmatic CDM for biogas recovery

from swine waste treatment system (CPA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small-scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[15,16] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[15] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[16] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

>>
Composting Programmatic CDM in XXX*[name of the project site]*, the Dominican Republic
Version 1
dd/mm/2010

A.2. Description of the small-scale CPA:

>>
Type of the CPA:
This CPA falls under Type XXX, as defined in the proposed CDM Small Scale Programmatic Activity Design Document (CDM-SC-PoA-DD).

Description of the CPA:
This CPA aims to avoid the production of methane from organic waste materials that are currently being left to decay anaerobically in a solid waste disposal sites in XXX in municipality of XXX

[Brief explanation on CPA site (municipaliy/ies) should be described here.]

This CPA will prevent methane emission by implementing a composting facility that treats waste materials through an aerobic process, and properly applying the produced compost into fields. The CPA does not recover or combust methane, and does not undertake controlled combustion of the waste. Annual emissions of methane from the proposed CPA are expected to be XXXt CO_2 equivalent annually (totally XXXt CO_2 equivalent within the first crediting period).

Purpose of the CPA:
The purpose of the CPA is to achieve "co-benefits"; where both the global environmental aim to reduce greenhouse gas emissions and the local social and economic needs are met. Promoting the implementation of composting through this CPA contributes to the sustainable development of XXX (specific area of the CPA) by bringing about the following economic, environmental, and social benefits:

Economic Benefits
- Investment from XXX*[Investing country(s)]* to the local economy
- Creation of job opportunities (e.g. in waste sorting and at composting facilities; XXX jobs) and potential stabilization of the volatile unemployment rate
- Capacity building of workers to develop viable skills (i.e. composting techniques and machinery operation) and provide information regarding health and safety measures
- Promotion of recycles and reuse of recyclables

Environmental Benefits
- Reduction of greenhouse gas emissions
- Improvement of sanitary conditions by presenting an alternative to dumping waste near households
- Improvement of soil quality due to the utilization of organic fertilizer and the reduction of chemical fertilizers
- Increase of waste collection that is mainly disposed improperly

Social Benefits

- Transfer of know-how on waste management and environmental technologies from XXX*[Investing country(s)]*
- Provision of alternative livelihoods to those currently working under hazardous conditions such as waste pickers[17] who make their livings by collecting and selling recyclable elements from dumping sites

A.3. Entity/individual responsible for the small-scale CPA:

Implementers for the CPA is/are XXX… and XXX. Among the implementers, the entity responsible for operation and management of composting facility is XXX. All the implementers will undertake waste collection within their municipalities and transport the collected waste to the composting facility.

- XXX *[Name of municipality]*
- XXX *[Name of municipality]*

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

The Dominican Republic

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The CPA site (composting facility) is located in the municipality of XXX. Latitude of the CPA site is N XX, XX'XX, and longitude is W XX, XX'XX. The address of the compost facility is provided below.

XXX, XXX,
XXX, the Dominican Repuclic

The waste collection for the facility operation will cover the municipalities of XXX … and XXX as shown in the following map.

[Illustrate the location of the CPA within the map below.]

[17] It is estimated that there are more than 200 waste pickers in Bohol Province based on investigation done by Bohol Provincial Government

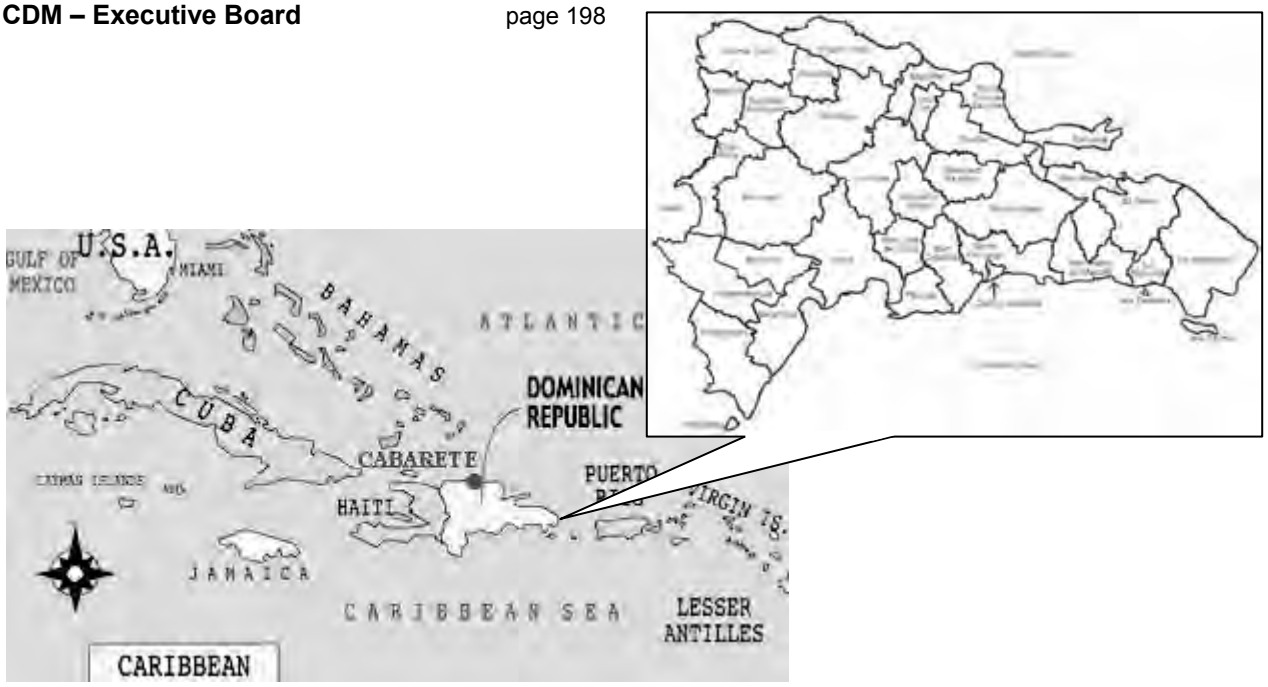


Figure 1. Location Map of the CPA Site and Waste Collection Coverage

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

This starting date of this CPA is dd/mm/2010, which is the same date as the proposed PoA.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

20years

A.4.3. Choice of the crediting period and related information:

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

The starting date of the crediting period is the registration date.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Table 1. Estimated amount of emission reduction

Years	Estimation of annual emission reductions (intCO_2e)
2010	XXX
2011	XXX
2012	XXX
2013	XXX
2014	XXX
2015	XXX
2016	XXX
Total emission reductions (tCO_2e)	XXX
Total number of crediting years	XXX
Annual average over the crediting period of estimated reductions (tCO_2e)	XXX

A.4.5. Public funding of the CPA:

No public funding is involved in this PoA and related CPAs and also this PoA does not include any diversion of ODA funds. *[#if any ODA fund is not involved in the project]*

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity with the following characteristics:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

[If the project participants are only part of this CPA:]
The project participant/s of the CPA is/are XXX. This CPA is the first and only CPA that XXX is part of. Therefore, it can be inferred that the CPA does not have the same project participants with any another CPAs (first criteria), thus verifying that the CPA is not a debundled component of another CPA.

[If the project participants are part of more than one CPAs, refer to A.4.4.1 (iii) of the proposed PoA for methods to verify that the CPA is not a debundled component and describe here.]

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

XXX*[name of CME]*, who is the managing entity of the PoA in which this CPA is under, will periodically obtain and update information regarding CDM project activities and PoAs related to composting. With this information, the Government of the Dominican Republic will verify prior to the implementation of the CPA that the small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA by confirming its geographic location does not correspond with any existing projects activities.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

Composting Programmatic CDM in the Dominican Republic

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

This CPA is eligible to be included in the registered PoA since it satisfies the criteria defined in A.4.2.2. in CDM-SC-PoA-DD of the registered PoA as described below.

Table 2. Applicability of the Proposed CPA

	Applicability conditions	Project case
1	A composting project to newly construct, or expand current, composting facility in order to treat organic waste materials that are otherwise treated through anaerobic fermentation in land fills	The activity of this CPA is applicable as described in A.2.
2	The produced compost is properly used for soil application	Applicable. Usage of the produced compost will be monitored.
3	The project satisfying the following condition · Establish that identified landfill(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or · Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill).	Applicable as the common practice for the organic waste in the Dominican Republic is disposal at landfill sites.
4	Located within the Dominican Republic	The activity of this CPA is applicable as described in A.4.1.2.
5	Achieves emission reductions of less than or equal to 60 kilotons CO2e/year per CPA	The activity of this CPA is applicable as the emission reduction achieved by this CPA is less than 60 kilotons CO_2 equivalent per year as shown in Table 1 in A.4.4.
6	Implements at least one of the technology options introduced in A.4.2.1	Applicable *[The technology to be applied is described here]*
7	Monitors and collects appropriate data on	Applicable (Describe confirmation to use the

	Applicability conditions	Project case
	the parameters listed in A.4.4.2	monitoring items listed in A.4.4.2)

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

In the absence of the CPA, organic waste materials are most likely to be disposed in legally allowable solid waste disposal sites in XXX*[name of CPA site]*, as is the current situation, resulting in the production and release of methane into the atmosphere. The CPA will reduce greenhouse gas emissions by avoiding the production of methane at dumpsites by composting the organic matter through an aerobic process instead of an anaerobic process.

According to the CDM-SC-PoA-DD of the registered PoA, the CPA would not have occurred due to the following investment barrier, technology barrier, barrier due to prevailing practice and other barriers.

d) Investment barrier:
Profits from sales of the compost are below the operation cost of the CPA
[Explanation on how the CPA meets the criteria]

e) Technology barrier:
A large-scale composting project that is operated by a group of municipalities or an entire city with a total solid waste generation of more than 50 tons/day (Type 3 CPA)
[Explanation on how the CPA meets the criteria]

f) Barrier due to prevailing practice:
Low adoption rate of composting facilities and most organic waste materials are being treated at dump sites. There are only XXX composting facilities reported within the country and most of them are pilot scale.

g) Other barriers: Access-to-finance barrier
Letter from financing banks that mentioning that CDM is the crucial factor for them to approve the loan.

h) Legal Barrier
The current practice of the waste treatment system at swine industry in the Dominican Republic is in accordance with the existing laws and regulations of the country, and there is no mandate or incentive for swine farmers to implement the proposed project activity in the Dominican Republic, which causes legal barrier for the implementation of the proposed project activity.

i) Other barriers:
Without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.
[Explanation on how the CPA meets the criteria]

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.
>>

The project boundary for the CPA is illustrated in the following figure. The boundary includes the municipal disposal site, composting facility site and application site of XXX.

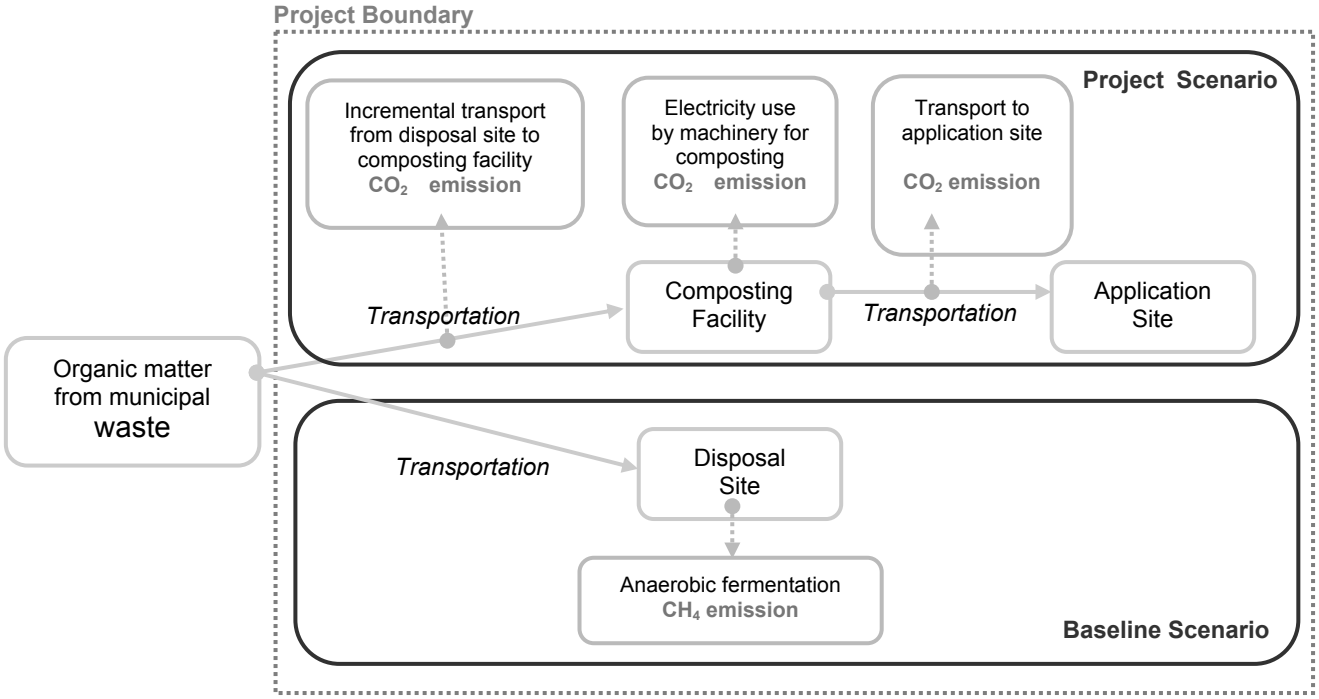


Figure 2. Layout of CPA Boundary

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

The detail information on the data and parameters not requiring monitoring are as described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in Annex 3.

Data / Parameter:	ϕ
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Any comment:	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase

	models was assessed to be 18%. Given the uncertainties associated with the model, and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied.
Value applied:	Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites.
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	DOC_f
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default value since no local values are available
Any comment:	

Data / Parameter:	DOC_j
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type *j*
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted

	from Volume 5, Tables 2.4 and 2.5)
Value applied:	Wood and wood products: 43 Pulp, paper and cardboard: 40 Food and food waste: 15 Textiles: 24 Garden and park waste: 20 Glass, plastic, metal and inert waste: 0
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values for wet base waste since no local values are available
Any comment:	

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type *j*
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value applied:	

	Tropical dry	Tropical wet
Pulp, paper, cardboard	0.045	0.07
Wood and wood products:	0.025	0.035
Other (non-food) putrescible garden and park waste	0.065	0.17
Food, f ood waste, sewage sludge, beverages and tobacco	0.085	0.40

Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values for wet tropical climate since no local data was available. The mean annual temperature is 25 centigrade [18] (>20 centigrade), and hence, the category of the area is "Tropical dry" or "Tropical wet" *[select whether the area is dry or wet]* in the table above as the mean annual precipitation in the province where the CPA is located is XXX mm (> or < 1000 mm) *[select inequality sign ">" or" <"]*.
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	· 1.0 for **anaerobic managed solid waste disposal sites**. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste.

[18] BBC whether (also cross checked by the data from the Oficina de Medico(ONAMET) of observation stations)

	· 0.8 for **unmanaged solid waste disposal sites – deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. · 0.4 for **unmanaged-shallow solid waste disposal sites.** This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 meters.
Justification of the choice of data or description of measurement methods and procedures actually applied:	The default values are given by "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)". The Government of Dominican Republic conducted field visits to landfill sites of each municipality in November 2007.
Any comment:	

Data / Parameter:	$MD_{y,reg}$
Data unit:	-
Description:	Methane that would be destroyed or removed in the year "y" for safety or comply with regulation.
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	No national/local regulations exist which enforce recovery or removal of landfill gas.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for raw waste collection
Source of data used:	Incremental collection distance between dumpsite and composting facility
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km/truck
Description:	Average distance for compost transportation
Source of data used:	Based on typical transportation distance in municipalities
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	Most probably the actual end users of the compost will not be known ex ante, therefore an average value will be estimated depending on the local conditions of each CPA.

Any comment:	

Data / Parameter:	$EFCO_2$
Data unit:	$kgCO_2/km$
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Table 1-28, p.1.71 and Table 1-31, p. 1.74.
Value applied:	Light duty gasoline trucks: 0.579 Light duty diesel trucks: 0.331
Justification of the choice of data or description of measurement methods and procedures actually applied:	The figure will be determined depending on the trucks to be used at each CPA.
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e / tCH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	Decisions under UNFCCC and the Kyoto Protocol
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied:	A value of 21 is to be applied for the first commitment period of the Kyoto Protocol
Any comment:	After first commitment period of the Kyoto Protocol, the figure should be reviewed under decisions under UNFCCC.

Data / Parameter:	f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	This project does not involve methane recovery.
Any comment:	

Data / Parameter:	$B_{0,ww}$
Data unit:	kg CH4/kg.COD
Description:	Methane producing capacity of the wastewater
Source of data used:	SCC-AMS III.F(Ver8), FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	0.21
Justification of the choice of data or description of measurement methods and	Standard value recommended by UNFCCC

procedures actually applied:	
Any comment:	

Data / Parameter:	**$MCF_{ww,treatment}$**
Data unit:	0.2
Description:	Methane correction factor for the wastewater treatment system where the runoff water is treated.
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	Discharge of wastewater to sea, river or lake 0.1 Aerobic treatment, well managed 0 Aerobic treatment, poorly managed or overloaded 0.3 Anaerobic digester for sludge without methane recovery 0.8 Anaerobic reactor without methane recovery 0.8 Anaerobic shallow lagoon (depth less than 2 metres) 0.2 Anaerobic deep lagoon (depth more than 2 metres) 0.8 Septic system 0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC for the facility to be installed
Any comment:	

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	1.06
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	**EF_{grid}**
Data unit:	$kgCO_2e/kWh$
Description:	Emission factor of the grid power
Source of data used:	Calculated based on the "Tool to calculate the emission factor for an electricity system"
Value applied:	0.7391
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on the public data derived from the "Determinación de la Línea Base de las Emisiones de Gases de Efecto Invernadero del Sector Eléctrico Nacional", Universidad nacional pedero henriques Urena Unphu (Aug.2009).
Any comment:	

Data / Parameter:	**NCV_{fuel}**
Data unit:	TJ/kt
Description:	NET Calorific value of the fuel of the fuel used

Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 43.0 Residual Fuel Oil: 40.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

Data / Parameter:	**EF_{fuel}**
Data unit:	tCO_2/TJ
Description:	CO_2 Emission factor of the fuel used
Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 74.1 Residual Fuel Oil: 77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

>>

(vi) Baseline Emissions

Baseline emissions were calculated by equation (1).

$$BE_y = BE_{CH4,SWDS,y} - MD_{reg,y} \times GWP_{CH4} + MEP_{y,ww} \times GWP_{CH4} + BE_{CH4,manure,y} \quad \ldots(1)$$

Where:

Parameter	Description	Figure	Unit	Data Source
BE_y	Baseline emissions in year "y"	Calculated by equation (1)	tCO_2e	-
$BE_{CH4,SWDS,y}$	Methane emissions avoided during year "y" from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year "y"	Calculated by equation (2)	tCO_2e	-
$MD_{reg,y}$	Amount of methane that would have to be captured and combusted in the year "y" to comply with the prevailing regulations	0	-	No regulations both in Dominican Republic requiring methane capture and/or combustion
$MEP_{y,ww}$	Methane emission potential in the year "y" of the wastewater. The value of this term is zero if co-composting of wastewater is not	0	-	The project activity does not include co-composting

	included in the project activity			
CH_4_GWP	Global Warming Potential (GWP) of methane, valid for the relevant commitment period	21	tCO_2e/tCH_4	Decisions under UNFCCC and the Kyoto Protocol
$BE_{CH4,manure,y}$	Where applicable, baseline emissions from manure composted by the project activities, as per the procedures of AMS-III.D	0	tCO_2e	Animal manure will not be used in the proposed project activity

Parameters required for the calculation of equation (1) are determined as follows:

- $BE_{CH4,SWDS,y}$: Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year y ($t\ CO_2e$)

Methane emissions from disposal site without the CPA is determined utilizing the following equation provided in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site," which has been revised at Executive Board (EB) 35.

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1 - e^{-k_j}\right) \quad \ldots(2)$$

Where:

Parameter	Description	Figure	Unit	Data Source
ϕ	Model correction factor to account for model uncertainties	0.9	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)	0.1 (for managed solid waste disposal sites) 0 (for other types of solid waste disposal sites)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
F	Fraction of methane in the SWDS gas (volume fraction)	0.5	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose	0.5	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
MCF	Methane correction factor	1.0 (for anaerobic managed solid waste disposal sites) 0.8 (for unmanaged solid waste disposal sites – deep and/or with high water table) 0.4 (for unmanaged-shallow solid waste disposal sites)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories

DOC_j	Fraction of degradable organic carbon (by weight) in the waste type j	Wood and wood products: 43 Pulp, paper and cardboard: 40 Food and food waste: 15 Texitile: 24 Garden and park waste: 20 Glass, plastic, metal and inert waste: 0	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
k_j	Decay rate for the waste type j	Pulp, paper, cardboard: 0.045(dry),0.07(wet) wood and wood products: 0.025(dry),0.035(wet) Other (non-food) putrescible garden and park waste: 0.065(dry),0.17(wet) Food, food waste, sewage sludge, beverages and tobacco: 0.085(dry),0.4(wet)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
x	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)	-	-	-
y	Year for which methane emissions are calculated	-	-	-

The more detail information on the each parameter is described in B.5.1.
For the extension of the crediting period, the most updated "IPCC Guidelines for National Greenhouse Gas Inventories" will be referred for figures regarding OX, F, DOC_f, MCF, DOC_j, k_j, GWP.

■ $W_{j,x}$: Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x*
Where different waste types j are prevented from disposal, determine the amount of different waste types ($W_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$W_{j,x} = W_x \times \frac{\sum_{n=1}^{z} P_{n,j,x}}{z} \quad \ldots(3)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in the year x	Refer to Annex 3	tons	Calculated by the statistical data of the Dominican Republic Government
W_x	Total amount of organic waste prevented from disposal in year x	Refer to Annex 3	tons	Calculated by the statistical data of the Dominican Republic Government
$P_{n,j,x}$	Weight fraction of the waste type j in the sample n collected during the year x	Refer to Annex 3	-	Calculated by the statistical data of the Dominican Republic Government
Z	Number of samples collected during the year x	1	-	-

■ W_x : Total amount of organic waste prevented from disposal in year x

As indicated in equation (4) below, the generation volume of organic wastes (W_x) was calculated by multiplying the average per capita waste generation volume (XX kg/person/day) by the total population in the Dominican Republic.

$$Wx = POP_x \times WC_x \times CR_x \quad \ldots(4)$$

Where:

Parameter	Description	Figure	Unit	Data Source
POP_x	Population of the related municipalities in year x	Refer to Annex 3	tons	The statistical data of the Dominican Republic Government
WC_x	Per capita garbage production in year x	XX	kg/person/day	Mean value of the Dominican Republic by the statistical data of the Dominican Republic Government
CR_x	Percent of garbage collected in year x	Refer to Annex 3	-	Data obtained from the related municipality

However, for municipalities with self-produced waste management assessments available, waste generation volumes were calculated utilizing figures from the local assessments

(vii) Project Emissions

Emissions from the CPA are the sum of the emissions from incremental transportation and electricity or diesel consumption due to the CPA, as described in the following equation.

$$PE_y = PE_{y,transp} + PE_{y,power} + PE_{y,phy\ leakage} + PE_{y,comp} + PE_{y,runoff} + PE_{y,res\ waster} \quad \ldots(5)$$

Where:

Parameter	Description	Figure	Unit	Data Source
PE_y	Project activity emissions in the year "y"	Calculated by equation (5)	t CO_2/y	-
$PE_{y,transp}$	Emissions from incremental transportation in the year "y"	Calculated by equation (6)	t CO_2/y	-
$PE_{y,power}$	Emissions from electricity or diesel consumption in the year "y"	Calculated by equation (7) or (7)'	t CO_2/y	-
$PE_{y,phy\ leakage}$	In case of anaerobic digestion: methane emissions from physical leakages of the anaerobic digester in year "y"	0	t CO_2/y	Not included in the calculation as anaerobic digestion of biomass is not involved in the proposed project activity.
$PE_{y,comp}$	In case of composting: methane emissions during composting process in the year "y"	Calculated by equation (8)	t CO_2/y	-

$PE_{y,runoff}$	In case of composting: methane emissions from runoff water in the year "y"	Calculated by equation (9)	t CO_2/y	-
$PE_{y,res\ waster}$	In case residual waste/slurry/ products are subjected to anaerobic storage or disposed in a landfill: methane emissions from the anaerobic decay of the residual waste/products	0	t CO_2/y	Not included in the calculation as no residual waste/slurry/ products are treated by anaerobic storage or disposed in a landfill

Parameters utilized to calculate equation (5) are determined as follows:

■ $PE_{y,transp}$: Emissions from incremental transportation in the year "y")

$$PE_{y,transp} = (Q_y/CT_y) \times DAF_w \times EF_{CO2} + (Q_{y,comp}/CT_{y,comp}) \times DAF_{comp} \times EF_{CO2} \quad \ldots (6)$$

Where:

Parameter	Description	Figure	Unit	Data Source
Q_y	Quantity of waste composted in the year "y"	Refer to Annex 3	tons	The statistical data of Dominican Republic Government
CT_y	Average truck capacity for waste transportation		tons/truck	
DAF_w	Average incremental distance for solid waste and/or wastewater transportation		km/truck	
EF_{CO2}	CO_2 emission factor from fuel use due to transportation	Light duty gasoline trucks: 0.579 Light duty diesel trucks: 0.331	kg CO_2/km	IPCC default values
$Q_{y,comp}$	Quantity of final compost product produced in the year "y"	Refer to Annex 3	tons	-
$CT_{y,comp}$	Average truck capacity for final compost product transportation		tons/truck	
DAF_{comp}	Average distance for final compost product transportation		km/truck	

■ $PE_{y,power}$: Emissions from power usage in the year "y"

If the proposed CPA consumes any power for compost production, $PE_{y,power}$ will be calculated by power consumption by the composting facilities in kWh/year($Electricity_y$) and the electricity emission factor. For the case where national grid electricity is used, $PE_{y,power}$ is calculated by Equation (7), for composting facilities that use on-site generator, $PE_{y,power}$ is calculated by Equation (7)'.

$$PE_{y\ power} = Electricity_y \times EF_{grid} \quad \ldots (7)$$

$$= Electricity_y \times Fuel \times NCV_{fuel} \times EF_{fuel} \quad \ldots (7)'$$

Where:

Parameter	Description	Figure	Unit	Data Source
$Electricity_y$	Annual electricity consumption	XXX	kWh/y	Assumption by project proponent
EF_{grid}	Emission factor of the grid power	0.7391	$kgCO_2e$/ kWh	"Determinación de la Línea Base de la s Emisiones de Gases de Efecto Inver nadero del Sector Eléctrico Nacional", Universidad Nacional Pedro Henriquez Urena Unphu, (Aug, 2009)
Fuel	Annual fuel consumption	XXX	tons/year	Assumption by project proponent
NCV_{fuel}	net calorific value of fuel used	**Gas/Diesel Oil: 43.0** Residual Fuel Oi l:40.4	TJ/kt	IPCC default values
EF_{fuel}	CO_2 emission factor of fuel used	**Gas/Diesel Oil: 74.1** Residual Fuel Oil: 77.4	$tCO2_e$/TJ	IPCC default values

■$PE_{y,comp}$:

Default emission factor for composting ($EF_{composting}$) of organic waste and/or manure (tCH4 /ton waste treated) provided in IPCC are 10gCH4/kg waste treated on a dry weight basis and 4gCH4/kg waste treated on a wet weight basis. While, $EF_{composting}$ can be set to zero for the portions of Qy for which the monitored oxygen content of the composting process is above 8%. This can be done via sampling with maximum margin of error of 10% at a 95% confidence level. For this purpose a portable oxygen meter can be used with lancets of at least 1 m length. In the case of forced aerated in-vessel and forced aerated pile composting systems continuous measurements may also be done using online sensors.

For CPAs under the PoA that do not monitor oxygen meter, the IPCC default value will be applied as described in the following equation:

$$PE_{y,composting} = Q_y \times EF_{composting} \times GWP_{CH4} \quad \ldots(8)$$

Where:

Parameter	Description	Figure	Unit	Data Source
Q_y	Quantity of waste composted and/or wastewater co-composted in the year "y"	XXX	t/y	Assumption by project proponent
$EF_{composting}$	Emission factor for composting of organic waste and/or manure	0.01(dry waste) 0.004(wet waste	tCH4/ton waste treated	IPCC default values
GWP_{CH4}	Global Warming Potential of methane, valid for the relevant commitment period	XXX	tCO_2e/tCH_4	Assumption by project proponent

■$PE_{y,runoff}$:

$$PE_{y,runoff} = Q_{y,ww,runoff} \times COD_{y,ww,runoff} \times B_{0,ww} \times MCF_{ww,treatment} \times UF_b \times GWP_{CH4} \quad \ldots(9)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$Q_{y,ww,runoff}$	Volume of runoff water in the year y	XXX	m3/y	Assumption by project proponent
$COD_{y,ww,runoff}$	Chemical oxygen demand of the runoff water leaving the composting facility in the year y	XXX	t/m3	Assumption by project proponent
$B_{0,ww}$	Methane producing capacity of the wastewater	0.21	kgCH4/kg.COD	IPCC default value
$MCF_{ww,treatment}$	Methane correction factor for the wastewater treatment system where the runoff water is treated	0.2	-	SSC-AMS III.F (Ver8)
UF_b	Model correction factor to account for model uncertainties	1.06	-	SSC-AMS III.F (Ver8)
GWP_{CH4}	Global Warming Potential of methane, valid for the relevant commitment period	21	tCO_2e/tCH_4	IPCC default value

(viii) Leakage Emissions

Emissions from leakage are calculated when composting facilities are transferred from other activities or existing composting facilities are transferred into other activities. Leakage emissions are 0 since this CPA does not transferred any facilities from other activities.

(ix) Emissions Reduction of Greenhouse Gas

GHG emissions reduction is calculated as indicated in equation (10).

$$ER_y = (BE_y - (PE_y + Leakage_y) \quad \ldots (10)$$

The emissions reduction achieved by the CPA activity in the case of increase of capacity utilization of existing composting facilities will be measured as the difference between the baseline emission and the sum of the CPA emission and leakage.

$$ER_y = (BE_y - PE_y) \times (1-r) \quad \ldots (11)$$

The value for r is determined as follows:

$$r = WCOM_{BAU}/TWCOM_y \quad \ldots (12)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$WCOM_{BAU}$	Reregistered annual amount of waste composted at the facility on a BAU basis calculated as the highest amount of annual compost production in the last five years prior to the project implementation	XXX	tons	Assumption by project proponent
$TWCOM_y$	Total quantity of waste composted in a year at the facility	-	tons	Monitored daya

B.5.3. Summary of the ex-ante estimation of emission reductions:

>>

Table 3. Summary of ex-ante estimation of emission reduction

Year	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of leakage (tCO_2 e)	Estimation of overall emission reductions (tCO_2 e)
2010	XXX	XXX	0	XXX
2011	XXX	XXX	0	XXX
2012	XXX	XXX	0	XXX
2013	XXX	XXX	0	XXX
2014	XXX	XXX	0	XXX
2015	XXX	XXX	0	XXX
2016	XXX	XXX	0	XXX
Total (tCO_2e)	XXX	XXX	0	XXX

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

>>

(iii) Monitoring and reporting framework

Monitoring and reporting framework is shown in the Figure 3 below. The compost facility operator carries out the operation and management of composting facilities. Based on monitoring manual that is provided the Government of Dominican Republic, XXX municipalities will monitor the average load of trucks for transportation of the waste and compost facility operator will monitor the operation of the facility and report to XXX *[name of CME]*, who will then undertake data checking, calculation of emission reduction, site visits and provision of advice to the municipalities. XXX *[name of CME]* will also be responsible for communication with Designated Operational Entity (DOE) for verification procedures. Items monitored by XXX *[name of CME]* are included in the figure below.

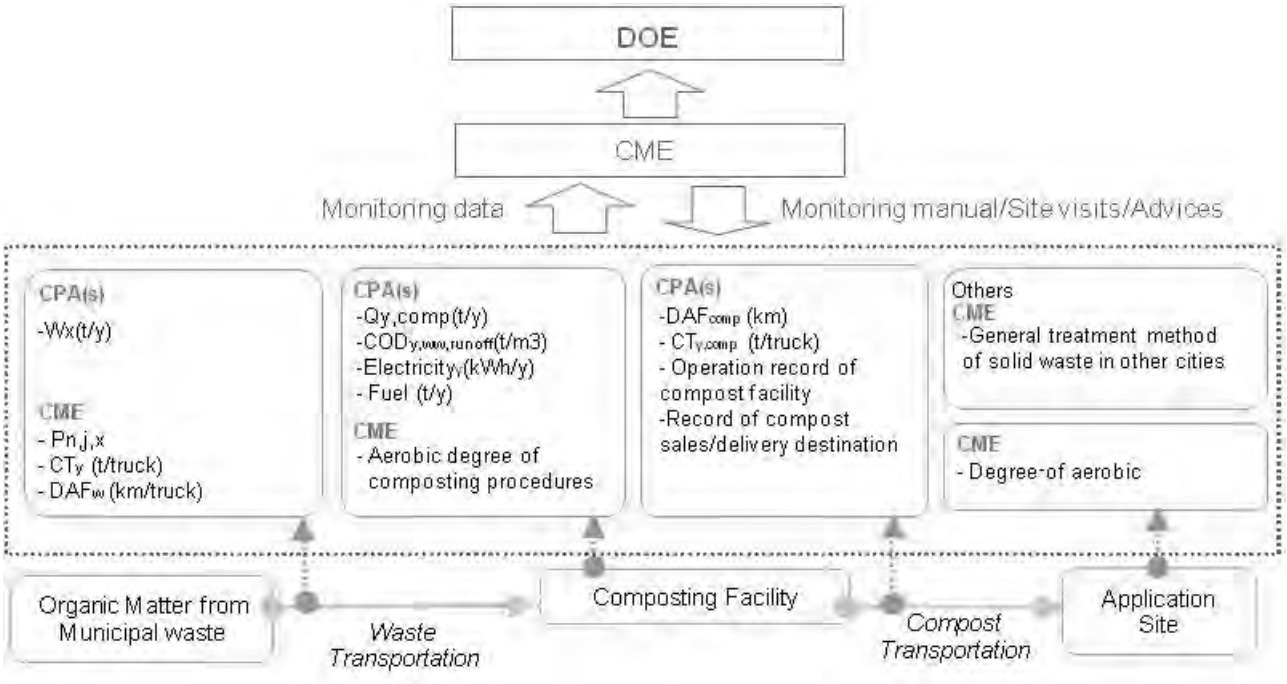


Figure 3. Monitoring plan for this CPA

(iv) Monitoring method
The detail information of the monitoring items and their monitoring method are described below.

Data / Parameter:	W_x
Data unit:	tons/year
Description:	Total amount of organic waste prevented from disposal in year x (tons)
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	[Type 1] For small-scale project (Type1), measurement will be taken by the compost facility operator. The weight will be estimated by the volume and the density of the waste. For Type 1 CPA, measurement by number of bags (boxes) used for transporting organic waste can be used. In this case, the mean weight of a bag (box) filled with organic waste shall be measured and used. [Type2, 3] All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. [Type1~3] Measurements will be conducted daily and the data is recorded and compiled in either digital or analogue format. The data will be sent regularly (at least annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used for measurement. Procedures will include regular calibration of scales since error could increase if scales are not calibrated.
Any comment:	

Data / Parameter:	$Q_{y,comp}$
Data unit:	tons/year
Description:	Quantity of compost produced in the year
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. For Type 1 CPA, measurement by number of bags (boxes) for organic waste transportation can be used. In this case, the mean weight of a bag (box)

	filled with organic wastes shall be measured and used as measurement unit. Measurements will be conducted daily the composting facility operator of each CPA and the data is recorded and compiled in either digital or analogue format by them. The data will be sent regularly (at least annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used and regular calibration of scales will be done in order to avoid error increase.
Any comment:	

Data / Parameter:	$P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected during year x
Source of data to be used:	Sampling by the municipal engineer in each municipality
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]* using proper equipment for weight fraction measurement will conduct sample measurement quarterly. Waste types include: (i) Pulp, paper, cardboard (other than sludge), textiles (ii) Wood, wood products and straw; (iii) Other (non-food) organic putrescible garden and park waste and (iv) Food, food waste, sewage sludge, beverages and tobacco in accordance with the waste types in IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
QA/QC procedures to be applied:	Potential error is low. Each municipality shall take sufficient samples to ensure a maximum uncertainty of 20% at a 95% confidence level. Regular calibration will be conducted and technical engineers will ensure proper procedures of sampling.
Any comment:	

Data / Parameter:	CT_y
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for waste transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]* will record the capacity of truck to be used for waste transport annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.

Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for solid waste transportation.
Source of data to be used:	Based on the distance of waste transportation by comparing the current waste transportation of related municipalities and the waste transportation plan developed for each CPA.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Incremental distance will be monitored using odometer by XXX*[#CME's name]* based on the current waste transportation distance and the waste transportation plan developed for each CPA.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km
Description:	Distance for destination of compost materials to be transferred
Source of data to be used:	Based on the mean distance from the composting facility to destination of the compost materials and the frequency of transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Distance will be estimated using rout map from the composting facility to destinations of the compost material. The destination and the frequency will be recorded by the composting facility operator of each CPA. The data will be gathered by XXX*[#CME's name]* annually.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	$CT_{y,comp}$
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for compost material transport
Value of data applied for the purpose of calculating expected emission reductions in	XXX

section B.5	
Description of measurement methods and procedures to be applied:	Composting facility operator will monitor and record the capacity of the truck to be used for compost transport. XXX*[#CME's name]* will gather the data annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.
Any comment:	

Data / Parameter:	$COD_{y,ww,runoff}$
Data unit:	Ton/m3
Description:	Chemical oxygen demand of the runoff water leaving the composting facility in the year y
Source of data to be used:	On-site sampling (Onsite Technicians/Workers)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Sampling will be done on-site and analysis will carried out at an off -site lab adhering to internationally accepted standards and archived electronically. Monthly average values will be used for the estimation of emissions.
QA/QC procedures to be applied:	The data will be cross-checked with samples analyzed by an external accredited laboratory once in 3 months.
Any comment:	

Data / Parameter:	Aerobic degree of composting procedures
Data unit:	-
Description:	Based on the aerobic degree of the waste during composing process.
Source of data to be used:	Analysed data of the samples taken at composting facilities
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Samples of the waste under composting will be taken four times a year by XXX*[#CME's name]* to measure the aerobic degree of the composting process. The sample taking and the analyzing method will be based on the proper procedures under provision of technical engineers.
QA/QC procedures to be applied:	Potential error is low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Soil application method to ensure aerobic condition of the compost.
Data unit:	-

Description:	Aerobic condition of the compost soil application
Source of data to be used:	Based on the soil application condition of the compost after distribution to the end users
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The soil application method of each destination will be briefly recorded when if is distributed/sold to the end user by composting facility operator of each CPA. XXX*[#CME's name]* will gather the data annually and the spot check to take samples to analyse aerobic degree of the compost will be conducted quarterly by XXX*[#CME's name]*.
QA/QC procedures to be applied:	Potential error will be low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Presence of a methane recovery facility at disposal site used by municipality
Data unit:	-
Description:	Demonstration that the amount of waste composted in the project activity facilities would have been disposed in a solid waste disposal site without methane recovery
Source of data to be used:	Site visits to disposal sites by XXX*[#CME's name]*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Observation of the presence or absence of a gas collection and use facility.
QA/QC procedures to be applied:	Potential error is not expected
Any comment:	

Data / Parameter:	**$Electricity_y$**
Data unit:	kWh/y
Description:	Annual electricity consumption
Source of data to be used:	Based on the electricity requirement of the composting facility assumed by the project proponent
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX

Description of measurement methods and procedures to be applied:	Power consumption will be monitored by electricity meter in kWh on a monthly basis. XXX*[#CME's name]* will gather data annually.
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

Data / Parameter:	**Fuel**
Data unit:	tons/year
Description:	Annual fuel consumption for onsite power generation assumed by the project proponent
Source of data to be used:	Based on the amount of electricity consumption and bills of purchasing the fuel
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Fuel consumption will be recorded by fuel purchase bill compiled by composting facility operator of each CPA. XXX*[#CME's name]* will gather data annually.
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

C.1. Please indicate the level at which environmental analysis, as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

[The contents of the analysis of environmental impacts will be provided here.]

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

[Whether or not the environmental impact analysis will be required to the CPA in accordance with the Department Administrative Order (DAO) 2003-30 will be described here.]

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☒ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

As indicated in the proposed PoA, a public consultation was held at the PoA level where representatives from the National Environmental Agency (DENR), Bohol Provincial Government, municipalities, research institutions, universities and environmental NGOs were invited and given the opportunity to discuss and provide comments to the PoA.

In addition to the public consultation at the PoA level, CPAs will invite and compile comments from local citizens by hosting a public consultation at the CPA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

[Provide a brief description how public consultations for local citizens are held and how comments from them are collected.]

D.3. Summary of the comments received:

[Comments from local citizens should be collected and summarized here.]

D.4. Report on how due account was taken of any comments received:

[The report on how the comments were received should be described here.]

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE small-scale CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

Table 4. Parameters Used to Determine OX and MCF

Municipality	Type of landfill managed by municipality	Depth of landfill	Level of water table	OX	MCF
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4

Source: Information provided by municipality and site observation

Table 5. Population Estimates in the First Crediting Period

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Source: Based on census 2000 of the Provincial of Bohol and the population increase data obtained by each municipality

Table 6. Estimated Waste Collection Ratio in the First Crediting Period [%]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7

Source: For xxx,… and xxx: Data from Solid Waste Management Assessment created by each municipalities, for other municipalities: Data obtained by each municipality

Table 7. Estimated Organic Waste Generation in the First Crediting Period [tons/day]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Source: Data obtained by each municipality

Table 8. Total Amount of Organic Waste Type *j* Prevented from Disposal ($W_{j,x}$) by the CPA [tons/day]

	wood	pulp	food	textiles	garden	others	total
Year1							
Year2							
Year3							
Year4							
Year5							
Year6							

Year7							
Total							

Table 9. Compost Production [tons/day]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Note: Estimated compost yield from the organic waste is assumed as 0.4.

Table 10. Other Information Related to Baseline

Municipality	Compost facility is newly built or expansion of existing one	Landfill Gas Collection	…
	New or Expansion of existing	No	
	New or Expansion of existing	No	
	New or Expansion of existing	No	
Source			

Annex 4

MONITORING INFORMATION

Refer to Section B.6.1 for the Monitoring Information.

- - - - -

PDD Modelo 4

Organic Waste Composting Programmatic CDM (PoA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small-scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

Composting Programmatic CDM in the Dominican Republic
Version 1
dd/mm/2010

A.2. Description of the small-scale programme of activities (PoA):

The "Composting Programmatic CDM in the Dominican Republic" (hereafter, the "PoA") comprises measures to avoid the production of methane from biomass or other organic matter that would have otherwise been left to decay anaerobically in solid waste disposal sites. With the project activity, decay of the biomass wastesis prevented through aerobic treatment by composting and proper soil application of the produced compost. The project activity does not recover or combust methane, and does not undertake controlled combustion of the waste. Annual emissions of methane from each CPA are expected to be less than 60 kilotons CO_2e annually.

(1) General operating and implementing framework of PoA

The Dominican Republic is an island country in the Caribbean region. The country is divided into 31 provinces with 9,755,954 populations in total[19].

The 31 provinces, depending on their regional characteristics and biodegradable waste quantity, are provided with the option of implementing the project independently (Type 1: Small scale), in a group of municipalities (Type 2: Medium scale), or at the entire city level (Type 3: Large scale).

The following figure describes the general operation framework of PoA and its relation to CDM Project activities (CPAs).

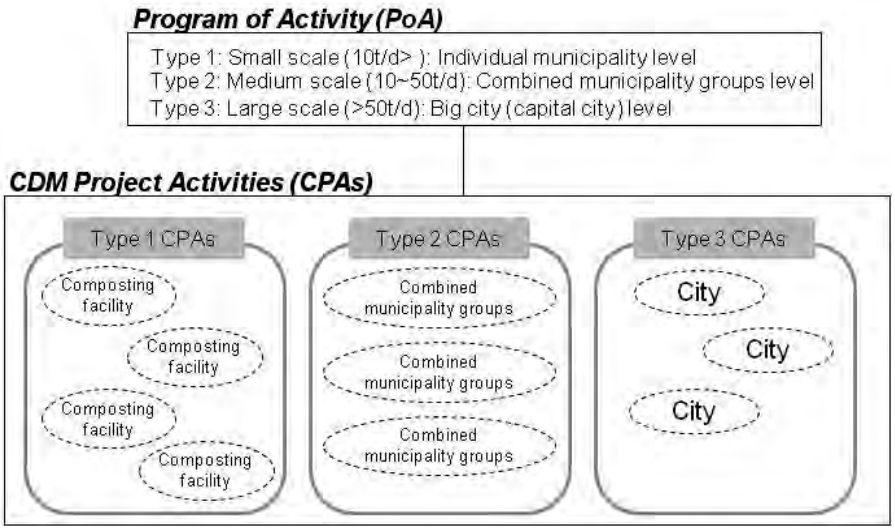


Figure 1. Implementing Framework of the PoA

(2) Policy/measure or stated goal of the PoA

[19] ONE forecast population for 2010 by the Oficina Nacional de Estatistica

The goal of the PoA is to promote segregation of municipal solid wastes and composting activities of biodegradable part of those wastes in the country as an effective waste management strategy where local safety and sanitation issues can be solved as well as reduction of greenhouse gas emissions.

In the Dominican Republic, a national norm[20] recommends taking measures to control gas emissions on landfills. However, very little effort has been made to comply with the norm at the local level as there is no mandate and/or incentive for the municipalities to comply with it. There are currently only two landfills are known taking measures to control greenhouse gas emission in the country: Duquesa landfill applying biogas collection (methane capture) and Santiago landfill applying semi-aerobic technology (methane avoidance). The both landfills receive supports from international donor agencies (See A.4.3. more in detail).

(3) Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

In spite of the norm, neither the National Government nor the Provincial Governments mandate greenhouse gas emission control including composting of organic waste materials under their law or policy. Therefore, the promotion of composting throughout the country is apparently a voluntary action.

The coordinating and managing entity of this PoA is XXX*[CME's name]*, which is XXX*[description of the CME]*. The promotion of composting through this PoA is voluntary effort that XXX*[CME's name]* intends to undertake as part of their commitment to the environment.

The PoA is designed to "co-benefit" both the global environmental aim to reduce greenhouse gas emissions, as well as the local social and economic needs. Promoting the implementation of composting through this PoA will contribute to the sustainable development of the Dominican Republic by bringing about the following economic, environmental and social benefits:

Economic Benefits
- Investments from XXX*[Investing country(s)]* to the local economy
- Creation of job opportunities (e.g. in waste sorting and at composting facilities) and potential stabilization of the volatile unemployment rate
- Capacity building of workers to develop viable skills (i.e. composting techniques and machinery operation) and provide information regarding health and safety measures
- Promotion of recycles and reuse of recyclables

Environmental Benefits
- Reduction of greenhouse gas emissions
- Improvement of sanitary conditions by presenting an alternative to dumping waste near households
- Improvement of soil quality due to the utilization of organic fertilizer and the reduction of chemical fertilizers
- Increase of waste collection that is mainly disposed improperly

[20] Norma para la gestión ambiental de residuos sólidos no peligrosos, June 2003

Social Benefits

- Transfer of know-how on waste management and environmental technologies from XXX*[Investing country(s)]*
- Provision of alternative livelihoods to those currently working under hazardous conditions such as waste pickers who make their livings by collecting and selling recyclable elements from dumping sites

A.3. Coordinating/managing entity and participants of SSC-POA:

5. Coordinating or managing entity of the PoA as the entity which communicates with the Board

   XXX*[CME's name]*

6. Project participants being registered in relation to the PoA

Table 1. Project Participants

Name of Party Involved (*) ((host) indicates a host party)	Private and/or public entity (ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of the Dominican Republic	XXX*[CME's name]*	No
Government of XXX *[investing country]*	XXX	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

The Dominican Republic

A.4.1.2.Physical/ Geographical boundary:

The boundary of the PoA is defined within the Dominican Republic, which is one of the Caribbean countries. The Dominican Republic is the second largest Caribbean nation, with 48,442 km^2 and an estimated approximately 10 million people.

Figure 2. Location of the Dominican Republic

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

Composting is a widely practiced waste treatment method where biodegradable organic matter is fermented, decomposed and stabilized under an aerobic process usually by bacteria. Composting has various benefits such as reducing the waste volume through decomposition of organic matter and water evaporation, as well as producing useful fertilizer and soil amendment through appropriate composting process. The below figure describes the general flow for composting of waste.

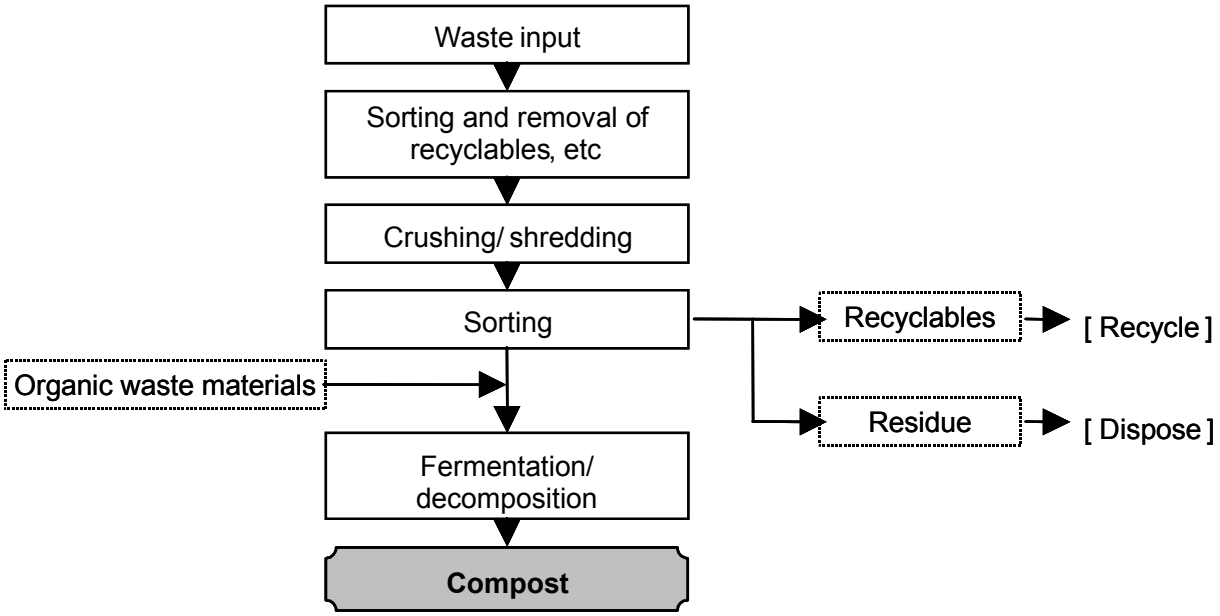


Figure 3. Flow of waste composting (mixed waste)

Appropriate composting techniques vary depending on the volume of the organic waste material. In the Dominican Republic, waste generation and collection volume in most municipalities, except for the big cities, ranges between few tons to few dozen tons per day. In these cases, a large-scale composting facility with mechanized sorting and shredding equipment is not cost effective. Instead, for such small to middle-scale composting projects, it is more effective and sustainable to implement sorting, fermentation and decomposition techniques that are mainly based on manual labor and allow partial implementation of machineries for specific processes (i.e. sorting, crushing, shredding, fermentation, etc.). For the purpose of better accommodating the unique regional composting needs, the PoA will make available the following three composting models with different technology options.

Type 1: Small-Scale Model

Type 1 is a small-scale composting project operated by individual municipalities with an average daily solid waste generation less than 10 tons/day. Biodegradable materials are sorted at the household level, then collected on regular basis by the municipal government. Once organic waste materials are brought to the composting facility, they are shredded, either manually or mechanically, then left for fermentation with regular turning to accelerate the process.

The following technology options are available for the small-scale composting model.

(1) Rotating Barrel Composter

The Rotating Barrel Composter speeds up the composting process by the frequent turning of the compost material. The equipment cost is relatively high compared to other options. Turning (rotation) of the machine can be done either manually or mechanically. The process of turning creates air circulation within the machine by moving the fin located inside, which consequently accelerates the decomposition process through increased aeration.

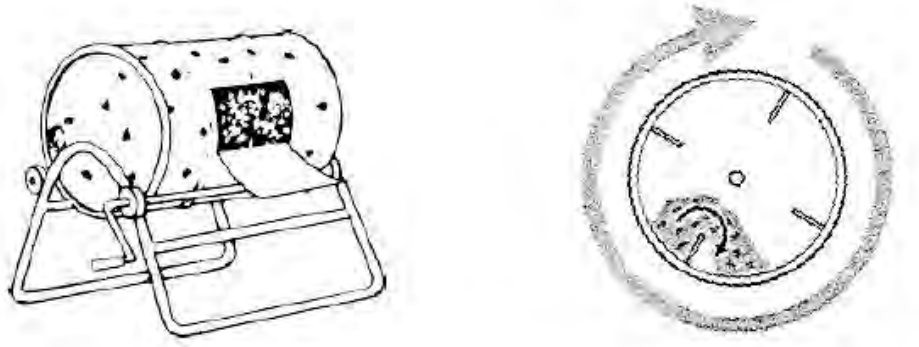


Figure 4. Rotating Barrel Composter (cross section image to the right)

(2) Bin/Container Type Composting Unit

Increasing air circulation of the compost by utilizing bin or container type composting units, as shown below, accelerates the fermentation and decomposition processes. Installing several of these units and transferring compost materials depending on their fermentation stage will enhance the compost maturation process and allow large volumes of organic waste materials to be composted at the same time.

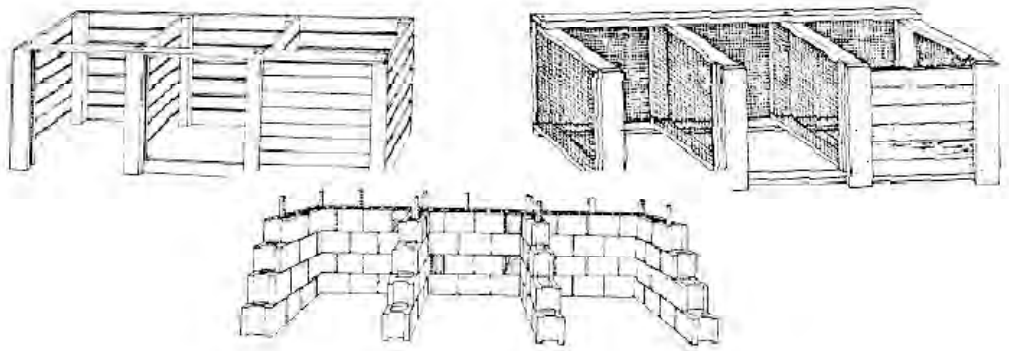


Figure 5. Examples of Combined Compost Bins/Containers for Staged Composting

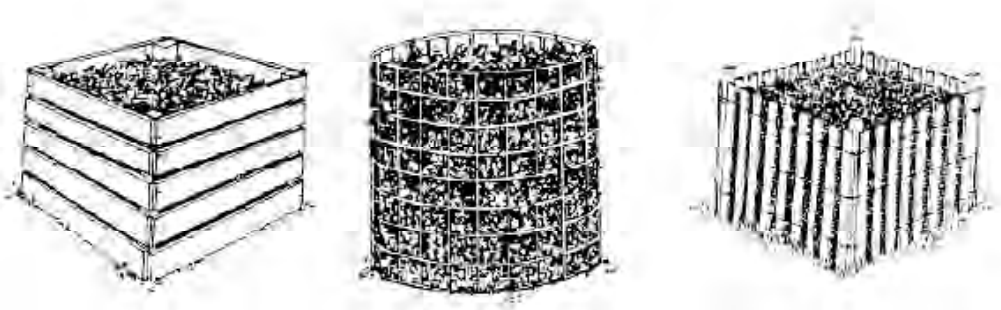


Figure 6. Examples of Single-Type Composting Unit

(3) Vermicompost

Vermicompost is a commonly used composting technology that utilizes earthworms to decompose organic waste materials. Five to eleven times more nitrogen, phosphorous and potassium of earthworms' initial consumption are estimated to be returned to the soil as discharge, creating nutritious, high quality fertilizers. However, compost temperature must be closely monitored and controlled since red worms and drandling worms are most active between 10~21° C. Therefore, installing a device,

such as shown below, that increases air circulation and allows temperature and water control is highly effective.

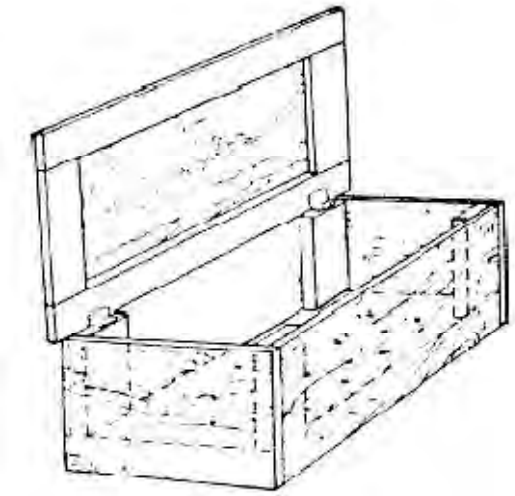


Figure 7. An Example of a Vermicompost

Type 2: Medium-Scale Model

Type 2 is a medium-scale composting project operated by a group of municipalities with total solid waste generation of 10 to 50 tons/day. For medium-scale composting, all or partial mechanization is recommended to increase the speed and efficiency of the composting process.

The windrow process is an effective method to speed up the composting process of medium-scale projects. The below figure describes the general composting flow of the windrow process.

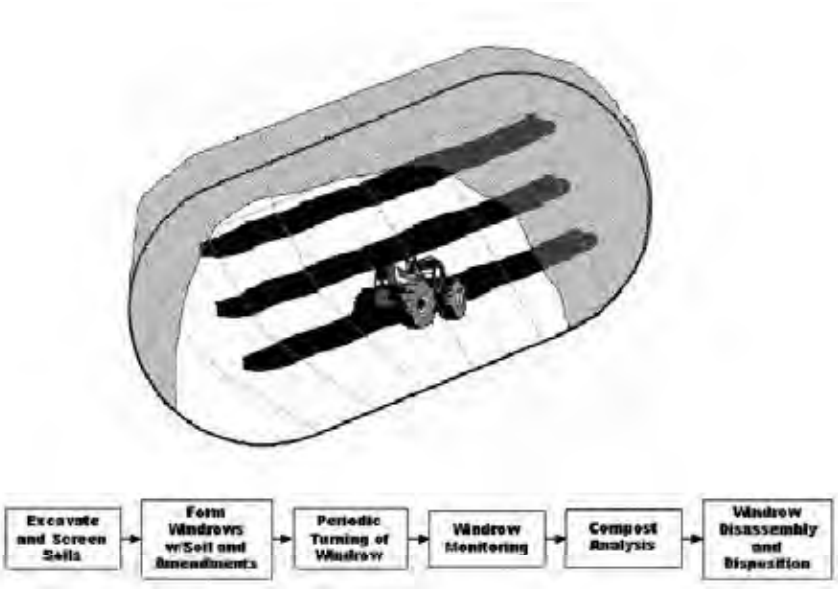


Figure 8. Composting Flow of Windrow Process

A practical technology option for this process is the windrow turner, a machine that turns the organic waste to ensure an even mixture, to provide aeration and to control temperature and moisture. Depending on the volume of organic waste, it is possible to implement the process manually, however in

a medium-scale composting project, the benefits of utilizing the windrow turner are high, such as assuring the production of a high quality compost as well as increasing the composting speed.

Figure 9. Image of The Windrow Turner

Type 3:Large-Scale Model

Type 3 is a large-scale composting project that is operated by a group of municipalities or an entire city with a total solid waste generation of more than 50 tons/day. Big cities will fall under this category according to its emission volume. Since large-scale composting projects generally require a lot of space and time, technologies to minimize the space required for the composting site and methods to increase the efficiency and speed of the composting processes, including manual processes, are highly demanded.

Mechanical Bio-Treatment (MBT) is a comprehensive system that combines diverse technologies required for a large-scale composting project. Through a mechanical process, organic waste materials are sorted from inorganic recyclables such as metal, glass and plastic. While the organic materials are biologically treated, the inorganic recyclables are collected.

Figure 10 illustrates the general flow of the MBT process. Flow A describes the processes involved in the composting of waste sorted at generation. Flow B describes the processes involved in the composting of mixed waste where sorting takes place at the composting facility.

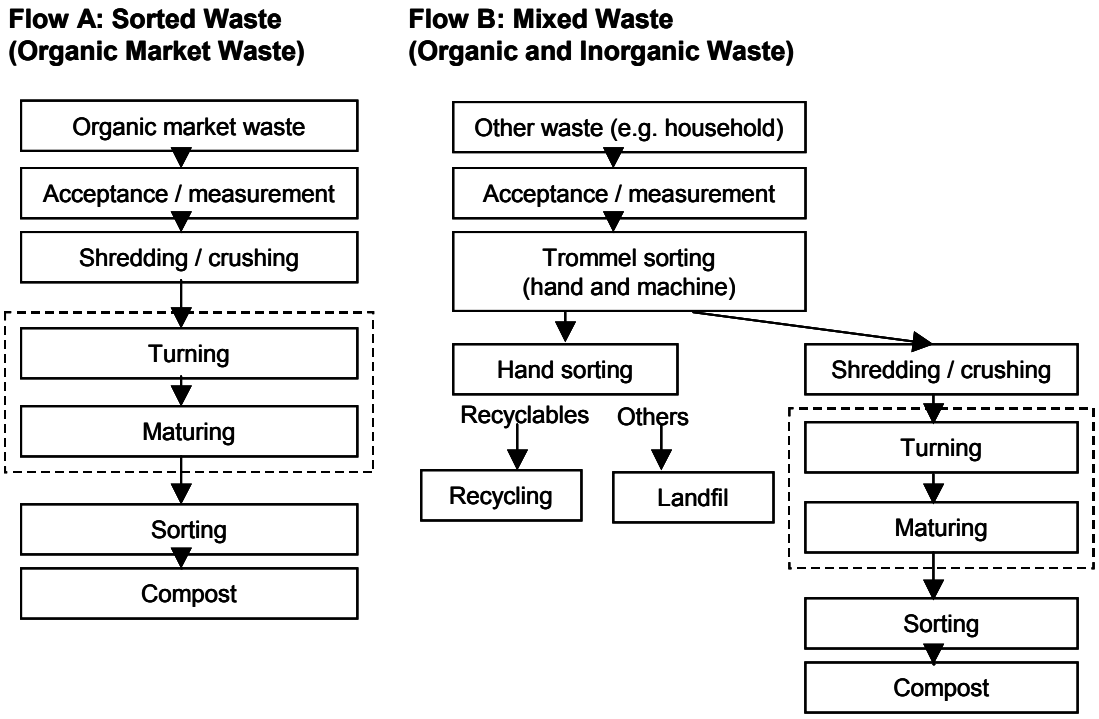


Figure 10. MBT Flow

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

The PoA defines the following criteria for inclusion of project activity as a CPA under the PoA.

- A composting project to newly construct, or expand current, composting facility in order to treat organic waste materials that are otherwise treated through anaerobic fermentation in land fills
- The produced compost is properly used for soil application
- The project satisfying the following condition
  - Establish that identified landfill(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or
  - Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill).
- Located within the Dominican Republic
- Achieves emission reductions of less than or equal to 60 kilotons CO2e/year per CPA
- Implements at least one of the technology options introduced in A.4.2.1
- Monitors and collects appropriate data on the parameters listed in A.4.4.2

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

The proposed PoA is a voluntary coordinated action as explained in A.2.(2).

As described in A.1., in the Dominican Republic, a national norm[21] recommends to take measures to control gas emissions on landfills. However, due to the lack of funds and technical support, very little effort has been made to comply with the norm at the local level as there is no mandate and/or incentive for the municipalities to comply with it. There are currently only two landfills are known taking measures to control greenhouse gas emission in the country: Duquesa landfill applying biogas collection (methane capture) and Santiago landfill applying semi-aerobic technology (methane avoidance). The both landfills receive supports from international donor agencies.

Regarding composting, in the country, waste are still treated mainly through open dumping, and it is reported that currently there were only XX existing facilities, most of which are small-scale facilities focused on the treatment of market waste. The lack of economic incentives due to the low market value of the compost can be identified as one of the major obstacles inhibiting the further establishment of composting projects. In addition, as mentioned above, neither the National Government nor the Provincial Governments mandate greenhouse gas emission control including composting of organic waste materials under their law or policy. Therefore it is unlikely that further efforts to promote composting projects will take place in the absence of the PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The following operational and management arrangements will be implemented by the coordinating/managing entity for the implementation of the PoA:

(ix) A record keeping system for each CPA under PoA

Regular monitoring and recording of specific parameters are carried out by individual CPAs. Data will be recorded digitally. XXX *[CME's name]* is responsible for collecting, storing and analyzing data from all CPAs where they will closely monitor the progress of each CPAs as well as provide assistance if necessary.

[21] Norma para la gestión ambiental de residuos sólidos no peligrosos, June 2003

The below figure describes the general layout of the record keeping system.

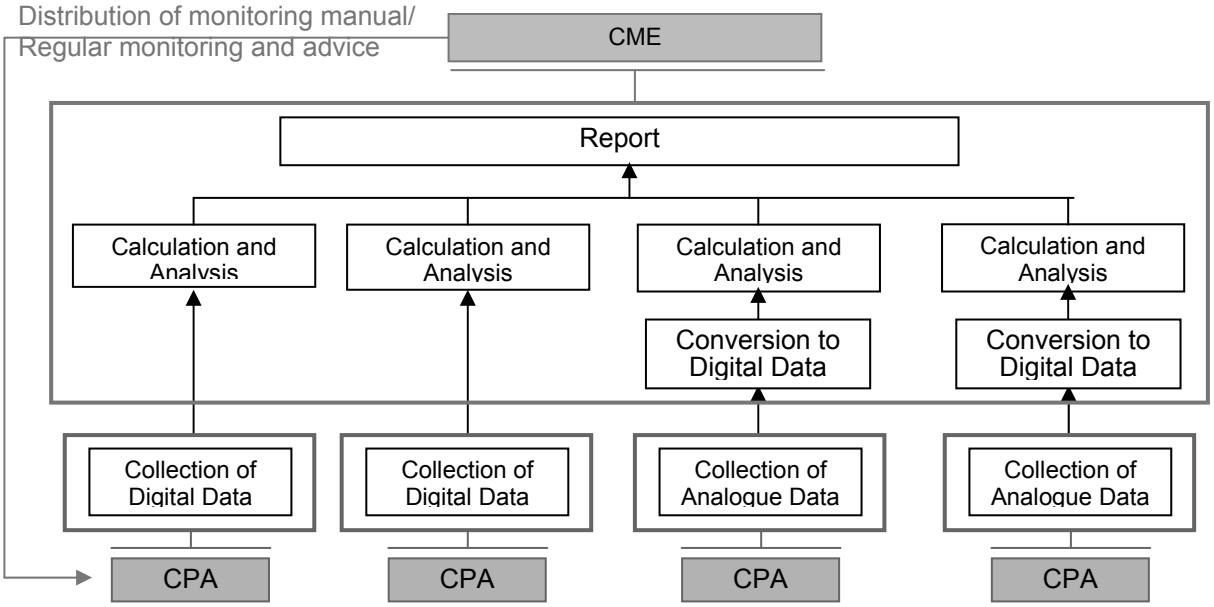


Figure11. Layout of Record Keeping System

(x) A system/procedure to avoid double counting

An identification system is implemented where numbers will be assigned to individual CPAs based on their geographic information. These CPA identification numbers are managed by XXX *[CME's name]* who will closely monitor individual CPAs to prevent double counting.

(xi) Verification that SSC-CPA is not a debunlded component of another CPA

Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities defines that a registered SSC-CPA shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

If the CPA is managed by project participants that are only taking part in one CPA, it can be inferred that the CPA does not have the same project participants with any another CPAs (first criteria), thus verifying that the CPA is not a debulded component of another CPA.

If the CPA is managed by project participants that are taking part in more than one CPAs, the CPA will verify within their CDM-SSC-CPA-DD that one or more of the above criteria for debundling are not met.

Finally, if the CPA meets all four of the criteria for debunlding, it will indicate within their CDM-SSC-CPA-DD that the small-scale project activity "both reduces anthropogenic emissions by sources and directly emits less than 60 kilotons of carbon dioxide equivalent annually," as stated in paragraph 6 (c) of the decision 17/CP.7. This is in concurrence with Appendix C of the Simplified

Modalities and Procedures for Small-Scale CDM project activities, which states that, "if a proposed small-scale project activity is deemed to be a debundled component, but the total size of such an activity combined with the previous registered small-scale CDM project activity does not exceed the limits for small-scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7, the project activity can qualify to use simplified modalities and procedures for small-scale CDM project activities."

(xii) Assurance that CPA operations/operators are being subscribed to the PoA

A stakeholder meeting was held where representatives from municipal agencies in the Dominican Republic. After the meeting, municipality representatives who agreed to the PoA have submitted a Letter of Intent (LOI) that confirms their intent of participation.

A.4.4.2. Monitoring plan:

The following parameters are monitored to verify the amount of reductions of anthropogenic emissions of greenhouse gases due to CPAs under the PoA.

Table 2. Monitored Parameters

No	Monitoring Item	Parameter	Unit	Monitoring Method	Monitoring Frequency	Monitoring Body
Parameters for Type 1 (Small Scale) PoAs						
1	Volume of carry-in waste[22]	-	m^3/year	To be measured visually	Daily	CPA
2	Density of carry-in waste[4]	-	tons/m^3	To be measured by equipment	Quarterly	CME
Parameters for Type 2 (Middle Scale) and Type 3 (Large Scale) PoAs						
3	Weight of carry-in waste	W_x	tons/year	To be measured by scale	Daily	CPA
Common Parameters for Type 1~3 PoA						
4	Quantity of compost produced in the year	Q_y	tons/year	To be measured by scale	Daily	CPA
5	Weight fraction of the waste type j in the sample n collected during year x	$P_{n,j,x}$	-	To be measured by equipment	Quarterly	CME
6	Average load of trucks (waste transport)	CT_y	t/truck	To be measured visually	Annually	CME
7	Increment of transport distance	DAF_w	km/ truck	To be calculated based on collection plan	Annually	CME
8	Average load of truck (compost transport)	$CT_{y,comp}$	tons /truck	To be calculated based on carry-in record	Annually	CPA
9	COD of the runoff water leaving the composting facility	$COD_{y,ww,runoff}$	tons /m3	Sampling measurement	Quarterly	CPA
10	Average distance of compost delivery	DAF_{comp}	km/ truck	To be calculated based on delivery list	Annually	CPA
11	Electricity consumption	$Electricity_y$	kWh/year	To be measured by meter	Daily	CPA

[22] (Volume of carry-in waste(m^3/year)) * (Density of carry-in waste(tons/m^3)) = W_x(tons/year)

12	Annual fuel consumption for onsite power generation assumed by the project proponent	Fuel	tons/year	Based on the amount of electricity consumption and bills of purchasing the fuel	Daily	CPA
13	Operation record of compost facility	-	-	To be recorded	Daily	CPA
14	Degree of aerobic of composting process	-	-	To be measured by equipment	Quarterly	CME
15	Record of compost sales/delivery destination	-	-	Delivery list to be recorded	Daily	CPA
16	General treatment method of solid waste in other cities	-		Interview investigation	Annually	CME

The overview of the data recording system is described in A.4.4.1. The managing entity, in this case XXX *[CME's name]*, will closely manage the collected data regarding the above parameters. In addition, the managing entity will assist the monitoring process at the CPA level by distributing monitoring manuals and necessary forms for data recording to CPAs, as well as making regular site visits to provide any necessary assistance and advice to the CPAs and solve any issues.

XXX *[CME's name]* will manage all the data in digital format, which will assure transparency through enabling easy access to the status of CPAs at anytime, as well as preventing double counting.

The more detailed information on the monitoring item will be described in Section E.

A.4.5. Public funding of the programme of activities (PoA):

No public funding is involved in this PoA and related CPAs and also this PoA does not include any diversion of ODA funds. *[#if any ODA fund is not involved in the project]*

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

dd/mm/ 2010

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

5. Environmental Analysis is done at PoA level ☒
6. Environmental Analysis is done at SSC-CPA level ☐

According to the "Environmental Impact Evaluation Procedure" by the Secretariat of State for the environment and natural resources, in the Dominican Republic, implementation of composting facilities are not required to conduct Environmental Impact Assessment unless the project site is located within vulnerable ecosystem.

Environmental analysis, therefore, needs to be done at SSC-CPA level rather than PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Composting significantly lowers the environmental impacts of existing waste treatment by avoiding methane emission through aerobic decomposition of organic waste.

Furthermore, the environmental impacts of the composting projects are considered potential and limited to the small area allocated for the composting facility. All organic waste materials composted in the PoA are collected within the Dominican Republic, and the compost produced is also used locally. Therefore, the environmental impacts from the PoA will be limited to within the province. Furthermore, as composting facilities will not produce any hazardous waste from its production process, and hence, no transboundary impacts are expected from the PoA.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

As indicated in C.1., environmental impact assessment is not required for the project activity unless the project site is located within vulnerable ecosystem.

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

5. Local stakeholder consultation is done at PoA level ☒
6. Local stakeholder consultation is done at SSC-CPA level ☒

[# The following description is an example]
Prior to the implementation of the project activity, interviews were held for the purpose of explaining the objectives, processes, implications and benefits for sustainable development of the PoA to relevant stakeholders, including the representatives from the National Agencies, Financial Institution, environmental NGOs, etc. Further stakeholders' comments, especially at the CPA levels must be collected through interviews with local agencies and citizens who are specifically related to the CPAs.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

[# The following description is an example]

Public comments were collected by individual interviews from the following organizations during the period between XX and XX 2010.

- National Agencies: Ministry of Environment and Natural Resources, XXX, XXX
- Industry association: XXX, XXX
- Environmental NGO: XXX, XXX
- International aid agencies: United Nations Development Programme, XXX, XXX
- Financial Institution: XXX, XXX

As described in D.1., comments from responsible persons of local agencies and citizens who are specifically related to the proposed project activity will be gathered at a later date through interviews at the CPA level.

D.3. Summary of the comments received:

[# The following description is an example]
Interviewees were generally very supportive towards the implementation of the PoA, viewing it as a positive opportunity for the Dominican Republic to gain the technological and financial support from XXX *[#investing country]* in order to improve water quality surrounding the waste disposal sites by introduction of composting facilities as well as create opportunities to provide positive impacts to rural agricultural communities. Moreover, no direct objections to the implementation of the proposed PoA were expressed during or after the interviews and public comments.

D.4. Report on how due account was taken of any comments received:

All clarifications requested by local attending stakeholders were addressed during the discussion after the presentations.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

SSC AMS-III.F. "Avoidance of methane production from biomass decay through composting, (Ver.8)" was applied to the baseline and monitoring methodologies in the PoA. SSC AMS-III.G. "Landfill Methane Recovery (Ver.6)" and Methodological Tool: "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site for the estimation of baseline emission of organic matter undergoing anaerobic decay at the solid waste dump site (Ver.5)" were also applied as references for SSC AMS-III.F.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

This PoA provides measures to avoid the production of methane from biomass or other organic matter, which would have otherwise been left to decay anaerobically at a solid waste disposal site. With the project activity, decay is prevented by treating the waste aerobically through composting and proper soil application of the compost. The project activity does not recover or combust methane, and does not undertake controlled combustion of the waste. Annual emissions of methane from each CPA are expected to be less than 60 kilotons CO_2e annually as described in Section E.

This PoA aims to construct and expand composting facilities, as well as promote activities that increase treatment capacities of existing composting facilities. For existing composting facilities, additional technologies and methods necessary to increase composting production capacity will be identified and described through the PoA.

E.3. Description of the sources and gases included in the SSC-CPA boundary

The project boundary for this PoA is illustrated in the following figure. The boundary applies to each CPAs under PoA and includes the municipal disposal site, composting facility site and application site.

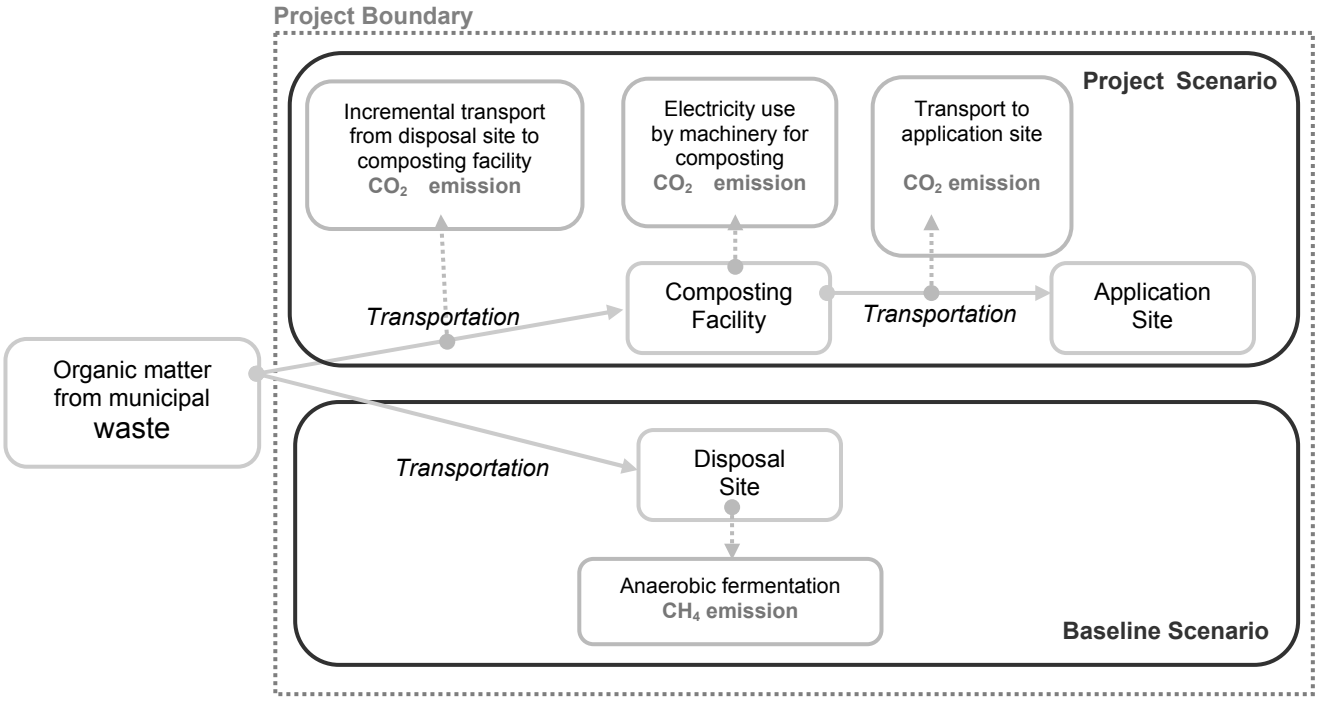


Figure 12. Layout of Project Boundary

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario is the continued disposal of organic waste material at open dumpsites in the project boundary, the Dominican Republic, and the resulting methane production at dumpsites due to anaerobic fermentation. Baseline scenario is identified based on parameters such as population projections, per capita waste generation volume, waste composition, percentage of biodegradable organic carbon content by waste type, rate of decay by waste type, waste collection rate, etc.

Data collection at the local level is necessary for calculating the population projection, per capita waste generation volume, waste collection rate and waste composition. Waste collection rate is gathered from both the municipal government and the Government of the Dominican Republic for each CPA. Due to the lack of waste composition data in many municipalities, waste composition figure of the national average is used for all CPAs. Details of other parameters are provided in E.6.3.and E.7.1.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

In the absence of the project activity, organic waste materials are most likely to be disposed in legally allowable solid waste disposal sites in the Dominican Republic, resulting in the production and release of methane into the atmosphere, as is the current situation. The project activity will reduce greenhouse gas emissions by avoiding the production of methane at dumpsites by composting the organic matter through an aerobic process instead of an anaerobic process.

However, the existence of the following barriers prevents the implementation of the PoA, leading to higher emissions indicated above.

Determination of additionality will be established in line with Attachment A of Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities. The project participants will provide an explanation to show that the project activity would not have occurred without the PoA, due to at least one of the following barriers: Investment barrier, Technology barrier and Barrier due to prevailing practice.

(a) Investment barrier

Despite the initial investments required for the implementation of the composting project, compost produced from organic waste material is expected to have a very low or no market value. Therefore, without the income from certified emissions reduction (CER) sales, the Project is not financially viable.

(b) Technology barrier

There is a technology barrier for the implementation of the PoA since the technologies that are proposed to be implemented for the middle and large-scale projects have not yet been applied in full scale in the Dominican Republic. There is a need to bring in new technologies for this PoA since due to the high O/M costs, it is currently not in operation. The windrow method for middle-scale projects and MBT system for large-scale projects proposed to be implemented through this PoA are not only new technologies to be introduced into the Dominican Republic, but also have high potentials of generating income through CER sales, which will make the project activity economically viable.

Most composting projects are currently being implemented in the Dominican Republic at the small-scale municipality level. At such small-scale composting projects there are no identifiable technology barriers since local technologies are utilized.

(c) Barrier due to prevailing practice

Although composting is considered as one of the effective measures to mitigate greenhouse gas emission reduction by landfill sites, it is not required by law. The implementation of composting has been very slow in the Dominican Republic with only XX facilities known throughout the country, most of which are small-scale. The majority of the organic waste materials are still managed at dumpsites.

Impact of CDM registration

The approval and registration of the CDM project will alleviate the identified barriers through diversion of some risks in the project to the CDM partner. Moreover, additional revenue from the sales of CER and

technology transfer and investment from countries such as XXX*[#Invest country]* will allow the municipalities to finance and implement new composting equipments.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Below are the key criteria for assessing the additionality of the CPA when proposed to be included in the registered PoA.

- Investment barrier: profits from sales of the compost are below the operation cost of the project
- Barrier to prevailing practice: low adoption rate of composting facilities, and most organic waste materials are being treated at dump sites
- Technology barrier: a large-scale composting project that is operated by a group of municipalities or an entire city with a total solid waste generation of more than 50 t/day (Type 3 CPA)

CPA under PoA must meet at least one of the above criteria to meet the additionality requirement.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Baseline emissions and project emissions are calculated by the equations defined by "SSC AMS III.F Avoidance of Methane Production from Decay of Biomass through Composting (Ver.8)." The parameters used for calculation are locally obtained values and default values determined by IPCC Guidelines for National Greenhouse Gas Inventories (2006).

According to SSC AMS-III.F., the yearly methane generation potential for the solid waste should be calculated using the first order decay model as described in category AMS III.G. "Landfill Methane Recovery (Ver.8)" referring to Methodological Tool: "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site for the estimation of baseline emission of organic matter undergoing anaerobic decay at the solid waste dump site (Ver.5)"(referring to equation (1) in E.6.2.).

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

(x) Baseline Emissions

Baseline emissions were calculated by equation (1).

$$BE_y = BE_{CH4,SWDS,y} - MD_{reg,y} \times GWP_{CH4} + MEP_{y,ww} \times GWP_{CH4} + BE_{CH4,manure,y} \quad \ldots(1)$$

Where:

BE_y: Baseline emissions in year "y" (tCO_2e)

$BE_{CH4,SWDS,y}$: Methane emissions avoided during year y from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year y (tCO_2e)

$MD_{reg,y}$: Amount of methane that would have to be captured and combusted in the year "y" to comply with the prevailing regulations

$MEP_{y,ww}$: Methane emission potential in the year "y" of the wastewater. The value of this term is zero

if co-composting of wastewater is not included in the project activity.

CH_4_GWP: Global Warming Potential (GWP) of methane, valid for the relevant commitment period (tCO_2e/tCH_4)

$BE_{CH4,manure,y}$: Where applicable, baseline emissions from manure composted by the project activities, as per the procedures of AMS-III.D (tCO_2e)

Parameters required for the calculation of equation (1) are determined as follows:

■ $BE_{CH4,SWDS,y}$:

Methane emissions from disposal site without the Project is determined utilizing the following equation provided in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site," which has been revised at Executive Board (EB) 35.

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1 - e^{-k_j}\right) \quad \ldots(2)$$

Where:

ϕ: Model correction factor to account for model uncertainties (0.9)

OX: Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)

F: Fraction of methane in the SWDS gas (volume fraction) (0.5)

DOC_f: Fraction of degradable organic carbon (DOC) that can decompose

MCF: Methane correction factor

DOC_j: Fraction of degradable organic carbon (by weight) in the waste type j

k_j: Decay rate for the waste type j

x: Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)

y: Year for which methane emissions are calculated

For the extension of the crediting period, the most updated "IPCC Guidelines for National Greenhouse Gas Inventories" will be referred for figures regarding OX, F, DOC_f, MCF, DOC_j, k_j, GWP.

■ $W_{j,x}$:

Where different waste types j are prevented from disposal, determine the amount of different waste types ($W_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$W_{j,x} = W_x \times \frac{\sum_{n=1} P_{n,j,x}}{z} \quad \ldots(3)$$

Where:

$W_{j,x}$: Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons)

W_x: Total amount of organic waste prevented from disposal in year x (tons)

$P_{n,j,x}$: Weight fraction of the waste type j in the sample n collected during the year x

Z: Number of samples collected during the year x

■ W_x :

As indicated in equation (4) below, the generation volume of organic waste (W_x) was calculated by multiplying the Dominican Republic's average per capita waste generation volume (XXkg/person/day) by the total population in the Dominican Republic.

$$Wx = POP_x \times WC_x \times CR_x \quad \ldots(4)$$

Where:

POP_x: Population of the related municipalities in year x
WC_x: Per capita garbage production in year x (0.XX kg/person/day: Mean value of the Dominican Republic)
CR_x: Percent of garbage collected in year x

However, for municipalities with self-produced waste management assessments available, waste generation volumes were calculated utilizing figures from the local assessments.

Following values are not included in baseline emission reduction calculation of CPAs under the PoA because of the reason described below:

- $MD_{reg,y}$: There is no regulation mandating biogas capture from the municipal wastes in the Dominican Republic.
- $MEP_{y,ww}$: Wastewater will not be used for composting at the CPAs under the PoA
- $BE_{CH4,manure,y}$: Manure will not be used for composting at the CPAs under the PoA

(xi) Project Emissions

Emissions from the project activity are the sum of the emissions from incremental transportation and electricity or diesel consumption due to project activity, as described in the following equation.

$$PE_y = PE_{y,transp} + PE_{y,power} + PE_{y,phy\ leakage} + PE_{y,comp} + PE_{y,runoff} + PE_{y,res\ waster} \quad \ldots(5)$$

Where:

PE_y: Project activity emissions in the year "y" (tCO2e)
$PE_{y,transp}$: Emissions from incremental transportation in the year "y" (tCO2e)
$PE_{y,power}$: Emissions from electricity or diesel consumption in the year "y" (tCO2e)
$PE_{y,phy\ leakage}$: In case of anaerobic digestion: methane emissions from physical leakages of the anaerobic digester in year y (tCO2e)
$PE_{y,comp}$: In case of composting: methane emissions during composting process in the year y (tCO2e)
$PE_{y,runoff}$: In case of composting: methane emissions from runoff water in the year y (tCO2e)
$PE_{y,res\ waster}$: In case residual waste/slurry/products are subjected to anaerobic storage or disposed in a landfill: methane emissions from the anaerobic decay of the residual waste/products (tCO2e)

Parameters utilized to calculate equation (5) are determined as follows:

■ $PE_{y,transp}$:

$$PE_{y,transp} = (Q_y/CT_y) \times DAF_w \times EF_{CO2} + (Q_{y,comp}/CT_{y,comp}) \times DAF_{comp} \times EF_{CO2}$$

… (6)

Where:

Q_y: Quantity of waste composted and/or wastewater co-composted in the year "y" (tons)
Ct_y: Average truck capacity for waste transportation (tons/truck)
DAF_w: Average incremental distance for solid waste and/or wastewater transportation (km/truck)
EF_{CO2}: CO_2 emission factor from fuel use due to transportation ($kgCO_2$/km, IPCC default values or local values may be used).
$Q_{y,comp}$: Quantity of final compost product produced in the year "y" (tons)
$CT_{y,comp}$: Average truck capacity for final compost product transportation (tons/truck)
DAF_{comp}: Average distance for final compost product transportation (km/truck)

■ $PE_{y,power}$:

If CPAs consume any power for compost production, $PE_{y,power}$ will be calculated by power consumption by the composting facilities in kWh/year($Electricity_y$) and the electricity emission factor. For the case where national grid electricity is used, $PE_{y,power}$ is calculated by Equation (7), for composting facilities that use on-site generator, $PE_{y,power}$ is calculated by Equation (7)'.

$$PE_{y\ power} = Electricity_y \times EF_{grid} \quad \ldots(7)$$

$$= Electricity_y \times Fuel \times NCV_{fuel} \times EF_{fuel} \quad \ldots(7)'$$

Where:

Parameter	Description	Figure	Unit	Data Source
$Electricity_y$	Annual electricity consumption	-	kWh/y	Determined at the CPA level
EF_{grid}	Emission factor of the grid power	0.7391	$kgCO_2e$/kWh	"Determinación de la Línea Base de las Emisio nes de Gases de Efecto Invernadero del Sector Eléctrico Nacional", Universidad Nacional Pedro Henriquez Urena Unphu, (Aug, 2009)
Fuel	Annual fuel consumption	-	tons/year	Determined at the CPA level
NCV_{fuel}	net calorific value of fuel used	**Gas/Diesel Oil: 43.0** Residual Fuel Oil:40. 4	TJ/kt	IPCC default values
EF_{fuel}	CO_2 emission factor of fuel used	**Gas/Diesel Oil: 74.1** Residual Fuel Oil: 77.4	$tCO2_e$/TJ	IPCC default values

■ $PE_{y,phy\ leakage}$:

This value is not included in project emission calculation as anaerobic digestion of biomass is not involved in the proposed project activity.

■$PE_{y,comp}$:

Default emission factor for composting ($EF_{composting}$) of organic waste and/or manure (tCH4 /ton waste treated) provided in IPCC are 10gCH4/kg waste treated on a dry weight basis and 4gCH4/kg waste treated on a wet weight basis. While, $EF_{composting}$ can be set to zero for the portions of Qy for which the monitored oxygen content of the composting process is above 8%. This can be done via sampling with maximum margin of error of 10% at a 95% confidence level. For this purpose a portable oxygen meter can be used with lancets of at least 1 m length. In the case of forced aerated in-vessel and forced aerated pile composting systems continuous measurements may also be done using online sensors.

For CPAs under the PoA that do not monitor oxygen meter, the IPCC default value will be applied as described in the following equation:

$$PE_{y,composting} = Q_y \times EF_{composting} \times GWP_{CH4} \quad \ldots(8)$$

Q_y: Quantity of waste composted and/or wastewater co-composted in the year "y" (tons)
$EF_{composting}$: Emission factor for composting of organic waste and/or manure (tCH4/ton waste treated)(0.01tCH4/t_waste_dry, 0.004tCH4/t_waste_wet)
GWP_{CH4}: Global Warming Potential of methane, valid for the relevant commitment period (tCO_2e/tCH_4)

■$PE_{y,runoff}$:

$$PE_{y,runoff} = Q_{y,ww,runoff} \times COD_{y,ww,runoff} \times B_{0,ww} \times MCF_{ww,treatment} \times UF_b \times GWP_{CH4} \quad \ldots(9)$$

$Q_{y,ww,runoff}$: Volume of runoff water in the year y (m3)
$COD_{y,ww,runoff}$: Chemical oxygen demand of the runoff water leaving the composting facility in the year y (tonnes/m3)
$B_{0,ww}$: Methane producing capacity of the wastewater (IPCC default value of 0.21kg CH4/kg.COD).
$MCF_{ww,treatment}$: Methane correction factor for the wastewater treatment system where the runoff water is treated.
UF_b: Model correction factor to account for model uncertainties (1.06)
GWP_{CH4}: Global Warming Potential of methane, valid for the relevant commitment period (tCO_2e/tCH_4)

■$PE_{y,res\ waster}$:
This value is not included in project emission calculation as no residual waste/slurry/products are treated by anaerobic storage or disposed in a landfill.

(xii) Leakage Emissions
Emissions from leakage are calculated when composting facilities are transferred from other activities or existing composting facilities are transferred into other activities.

(xiii) Emissions Reduction of Greenhouse Gas
GHG emissions reduction is calculated as indicated in equation (10).

$$ER_y = (BE_y - (PE_y + Leakage_y) \quad \ldots(10)$$

ER_y: Emissions reduction in year "y" (tCO_2e)

BE_y: Baseline emissions in year "y" (tCO_2e)
PE_y: Project emissions in year "y" (tCO_2e)
$Leakage_y$: Emissions due to leakage in year y

The emissions reduction achieved by the project activity from increase of utilization capacity of existing composting facilities will be measured by calculating the difference between the baseline emission and the sum of the project emission and leakage.

$$ER_y = (BE_y - PE_y) \times (1-r) \quad \ldots (11)$$

The value for r is determined as follows:

$$r = WCOM_{BAU}/TWCOM_y \quad \ldots (12)$$

Where:

$WCOM_{BAU}$: Reregistered annual amount of waste composted (tons) at the facility on a BAU basis calculated as the highest amount of annual compost production in the last five years prior to the project implementation
$TWCOM_y$: Total quantity of waste composted in a year (tons) at the facility

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	ϕ
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Ver.5)"
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Ver.5)"
Any comment:	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model, and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied.
Value applied:	Use 0.1 for managed solid waste disposal sites that are covered with oxidizing

	material such as soil or compost. Use 0 for other types of solid waste disposal sites.
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Ver.5)"
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	DOC_f
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default value since no local values are available
Any comment:	

Data / Parameter:	DOC_j
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value applied:	Wood and wood products: 43 Pulp, paper and cardboard (other than sludge): 40 Food and food waste (other than sludge): 15 Textiles: 24 Garden and park waste: 20 Glass, plastic, metal and inert waste: 0
Justification of the choice of data or	IPCC default values for wet base waste since no local values are available

description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value applied:	

	Tropical dry	Tropical wet
Pulp, paper, cardboard	0.045	0.07
Wood and wood products:	0.025	0.035
Other (non-food) putrescible garden and park waste	0.065	0.17
Food, f ood waste, sewage sludge, beverages and tobacco	0.085	0.40

Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values for wet tropical climate since no local data was available. The mean annual temperature is 25 centigrade[23] (>20 centigrade), and hence, for the provinces where Mean annual precipitation is below 1,000mm/y, project site is categorized as "Tropical Dry" <1,000 mm, >20 centigrade), while where Mean annual precipitation is above 1,000 mm, it is categorized as "Tropical wet (>1,000 mm, >20 centigrade)".
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	▪ 1.0 for **anaerobic managed solid waste disposal sites**. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste. ▪ 0.8 for **unmanaged solid waste disposal sites – deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. ▪ 0.4 for **unmanaged-shallow solid waste disposal sites.** This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 meters.
Justification of the	The default values are given by "Tool to determine methane emissions avoided

[23] BBC whether (also cross checked by the data from the Oficina de Medico(ONAMET) of observation stations)

choice of data or description of measurement methods and procedures actually applied:	from dumping waste at a solid waste disposal site (Ver.5)".
Any comment:	

Data / Parameter:	$MD_{y,reg}$
Data unit:	-
Description:	Methane that would be destroyed or removed in the year "y" for safety or comply with regulation.
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	No national/local regulations exist which enforce recovery or removal of landfill gas.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for raw waste collection
Source of data used:	Incremental collection distance between dumpsite and composting facility
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km/truck
Description:	Average distance for compost transportation
Source of data used:	Based on typical transportation distance in municipalities
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	Most probably the actual end users of the compost will not be known ex ante, therefore an average value will be estimated depending on the local conditions of each CPA.
Any comment:	

Data / Parameter:	$EFCO_2$
Data unit:	$kgCO_2/km$
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Table 1-28, p.1.71 and Table 1-31, p. 1.74.
Value applied:	Light duty gasoline trucks: 0.579 Light duty diesel trucks: 0.331
Justification of the choice of data or description of measurement methods and procedures actually applied:	The figure will be determined depending on the trucks to be used at each CPA.
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e / tCH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	Decisions under UNFCCC and the Kyoto Protocol
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied:	A value of 21 is to be applied for the first commitment period of the Kyoto Protocol
Any comment:	After first commitment period of the Kyoto Protocol, the figure should be reviewed under decisions under UNFCCC.

Data / Parameter:	f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	This project does not involve methane recovery.
Any comment:	

Data / Parameter:	$EF_{composting}$
Data unit:	tCH4/ton waste treated
Description:	Emission factor for composting of organic waste and/or manure
Source of data used:	Table 4.1, chapter 4, Volume 5, 2006 IPCC Guidelines for National Greenhouse

	Gas Inventories
Value applied:	0.01tCH4/t_waste for dry waste, 0.004tCH4/t_waste for wet waste
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	$B_{0,ww}$
Data unit:	kg CH4/kg.COD
Description:	Methane producing capacity of the wastewater
Source of data used:	SCC-AMS III.F(Ver8), FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	0.21
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	**$MCF_{ww,treatment}$**
Data unit:	0.2
Description:	Methane correction factor for the wastewater treatment system where the runoff water is treated.
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	Discharge of wastewater to sea, river or lake 0.1 Aerobic treatment, well managed 0 Aerobic treatment, poorly managed or overloaded 0.3 Anaerobic digester for sludge without methane recovery 0.8 Anaerobic reactor without methane recovery 0.8 Anaerobic shallow lagoon (depth less than 2 metres) 0.2 Anaerobic deep lagoon (depth more than 2 metres) 0.8 Septic system 0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC for the facility to be installed
Any comment:	

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	1.06

Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	**EF_{grid}**
Data unit:	$kgCO_2e/kWh$
Description:	Emission factor of the grid power
Source of data used:	Calculated based on the "Tool to calculate the emission factor for an electricity system"
Value applied:	0.7391
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on the public data derived from the "Determinación de la Línea Base de las Emisiones de Gases de Efecto Invernadero del Sector Eléctrico Nacional", Universidad nacional pedero henriques Urena Unphu (Aug.2009).
Any comment:	

Data / Parameter:	**NCV_{fuel}**
Data unit:	TJ/kt
Description:	NET Calorific value of the fuel of the fuel used
Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 43.0 Residual Fuel Oil: 40.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

Data / Parameter:	**EF_{fuel}**
Data unit:	tCO_2/TJ
Description:	CO_2 Emission factor of the fuel used
Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 74.1 Residual Fuel Oil: 77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	W_x
Data unit:	tons/year
Description:	Total amount of organic waste prevented from disposal in year x (tons)
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	[Type 1] For small-scale project (Type1), measurement will be taken by the compost facility operator. The weight will be estimated by the volume and the density of the waste. For Type1 CPA, measurement by number of bags (boxes) used for transporting organic waste can be used. In this case, the mean weight of a bag (box) filled with organic waste shall be measured and used. [Type2, 3] All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. [Type1~3] Measurements will be conducted daily and the data is recorded and compiled in either digital or analogue format. The data will be sent regularly (at least annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used for measurement. Procedures will include regular calibration of scales since error could increase if scales are not calibrated.
Any comment:	

Data / Parameter:	$Q_{y,comp}$
Data unit:	tons/year
Description:	Quantity of compost produced in the year
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. For Type 1 CPA, measurement by number of bags (boxes) for organic waste transportation can be used. In this case, the mean weight of a bag (box) filled with organic waste shall be measured and used as measurement unit.

	Measurements will be conducted daily the composting facility operator of each CPA and the data is recorded and compiled in either digital or analogue format by them. The data will be sent regularly (at least annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used and regular calibration of scales will be done in order to avoid error increase.
Any comment:	

Data / Parameter:	$P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected during year x
Source of data to be used:	Sampling by the municipal engineer in each municipality
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]* using proper equipment for weight fraction measurement will conduct sample measurement quarterly. Waste types include: (i) Pulp, paper, cardboard (other than sludge), textiles (ii) Wood, wood products and straw; (iii) Other (non-food) organic putrescible garden and park waste and (iv) Food, food waste, sewage sludge, beverages and tobacco in accordance with the waste types in IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
QA/QC procedures to be applied:	Potential error is low. Each municipality will take sufficient samples to ensure a maximum uncertainty of 20% at a 95% confidence level. Regular calibration will be conducted and technical engineers will ensure proper procedures of sampling.
Any comment:	

Data / Parameter:	CT_y
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for waste transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]*will record the capacity of truck to be used for waste transport annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for solid waste transportation
Source of data to be used:	Based on the distance of waste transportation by comparing the current waste transportation of related municipalities and the waste transportation plan developed for each CPA.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]*, based on the current waste transportation distance and the waste transportation plan developed for each CPA, will monitor incremental distance using odometer.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km
Description:	Distance for destination of compost materials to be transferred
Source of data to be used:	Based on the mean distance from the composting facility to destination of the compost materials and the frequency of transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Distance will be estimated using rout map from the composting facility to destinations of the compost material. The composting facility operator of each CPA will record the destination and the frequency. XXX*[#CME's name]* will gather the data annually.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	$CT_{y,comp}$
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for compost material transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods	Composting facility operator will monitor and record the capacity of the truck to be used for compost transport. XXX*[#CME's name]* will gather the data

and procedures to be applied:	annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.
Any comment:	

Data / Parameter:	$COD_{y,ww,runoff}$
Data unit:	Ton/m3
Description:	Chemical oxygen demand of the runoff water leaving the composting facility in the year y
Source of data to be used:	On-site sampling (Onsite Technicians/Workers)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Sampling will be done on-site and analysis will carried out at an off -site lab adhering to internationally accepted standards and archived electronically. Monthly average values will be used for the estimation of emissions.
QA/QC procedures to be applied:	The data will be cross-checked with samples analyzed by an external accredited laboratory once in 3 months.
Any comment:	

Data / Parameter:	Aerobic degree of composting procedures
Data unit:	-
Description:	Based on the aerobic degree of the waste during composing process
Source of data to be used:	Analysed data of the samples taken at composting facilities
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Samples of the waste under composting will be taken four times a year by XXX*[#CME's name]* to measure the aerobic degree of the composting process. The sample taking and the analyzing method will be based on the proper procedures under provision of technical engineers.
QA/QC procedures to be applied:	Potential error is low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Soil application method to ensure aerobic condition of the compost
Data unit:	-
Description:	Aerobic condition of the compost soil application
Source of data to be used:	Based on the soil application condition of the compost after distribution to the end users
Value of data applied	

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The soil application method of each destination will be briefly recorded when if is distributed/sold to the end user by composting facility operator of each CPA. The XXX*[#CME's name]* will gather the data annually and the spot check to take samples to analyse aerobic degree of the compost will be conducted quarterly by the XXX*[#CME's name]*.
QA/QC procedures to be applied:	Potential error will be low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Presence of a methane recovery facility at disposal site used by municipality
Data unit:	-
Description:	Demonstration that the amount of waste composted in the project activity facilities would have been disposed in a solid waste disposal site without methane recovery
Source of data to be used:	Site visits to disposal sites by XXX*[#CME's name]*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Observation of the presence or absence of a gas collection and use facility
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

Data / Parameter:	**Electricity$_y$**
Data unit:	kWh/y
Description:	Annual electricity consumption
Source of data to be used:	Based on the electricity requirement of the composting facility
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Power consumption will be monitored by electricity meter in kWh on a monthly basis. XXX*[#CME's name]* will gather data annually.

QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

Data / Parameter:	**Fuel**
Data unit:	tons/year
Description:	Annual fuel consumption for onsite power generation
Source of data to be used:	Based on the amount of electricity consumption and bills of purchasing the fuel
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Fuel consumption will be recorded by fuel purchase bill compiled by composting facility operator of each CPA. XXX*[#CME's name]* will gather data annually.
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

E.7.2. Description of the monitoring plan for a SSC-CPA:

Monitoring and reporting framework is shown in Figure13. The operation and management of composting facilities are carried out by the compost facility operator (related municipalities). Based on a project operation and monitoring manual, municipalities will monitor the project operations and report to the XXX*[#CME's name]*, who will then undertake data checking, calculation of emission reduction, site visits and provision of advice to the municipalities. XXX*[#CME's name]* will also be responsible for communication with Designated Operational Entity (DOE) for verification procedures. Items monitored by the XXX*[#CME's name]* are included in the figure below.

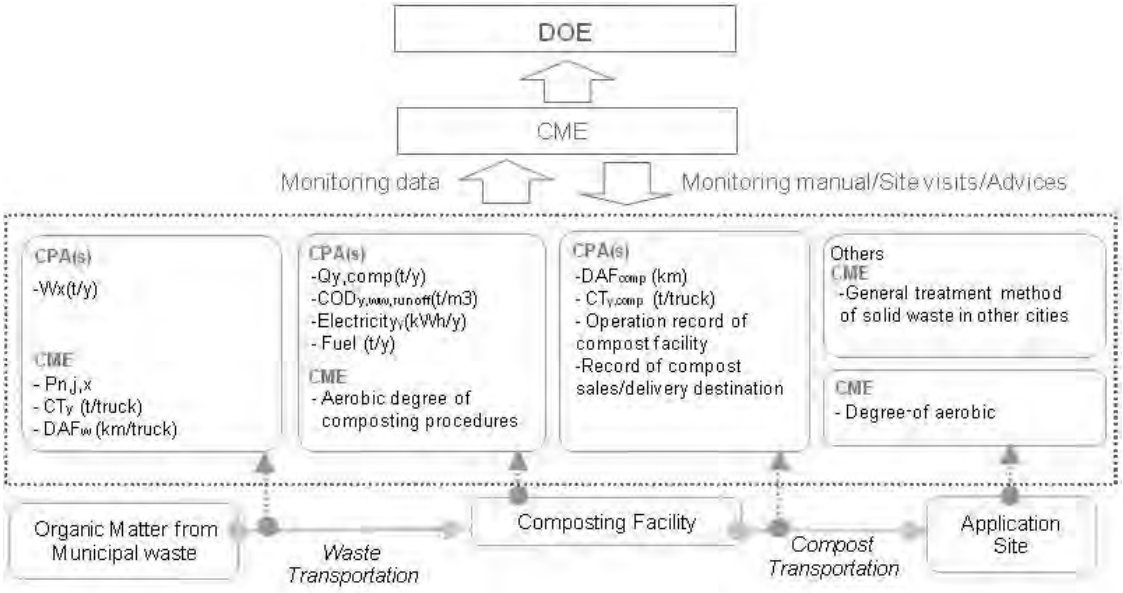


Figure13. Monitoring plan for an SSC-CPA

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

dd/mm/2010

[#Name]
[#Company]
[#Address]
Tel: XXX, Fax:XXX

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	

Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

Baseline information is described in Section E.

Annex 4

MONITORING INFORMATION

Refer to Section D. for the Monitoring Information

- - - - -

PDD Modelo 4

Organic Waste Composting Programmatic CDM (CPA-DD)

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small-scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[24,25] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[24] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[25] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

>>
Composting Programmatic CDM in XXX*[name of the project site]*, the Dominican Republic
Version 1
dd/mm/2010

A.2. Description of the small-scale CPA:

>>
Type of the CPA:
This CPA falls under Type XXX, as defined in the proposed CDM Small Scale Programmatic Activity Design Document (CDM-SC-PoA-DD).

Description of the CPA:
This CPA aims to avoid the production of methane from organic waste materials that are currently being left to decay anaerobically in a solid waste disposal sites in XXX in municipality of XXX

[Brief explanation on CPA site (municipaliy/ies) should be described here.]

This CPA will prevent methane emission by implementing a composting facility that treats waste materials through an aerobic process, and properly applying the produced compost into fields. The CPA does not recover or combust methane, and does not undertake controlled combustion of the waste. Annual emissions of methane from the proposed CPA are expected to be XXXt CO_2 equivalent annually (totally XXXt CO_2 equivalent within the first crediting period).

Purpose of the CPA:
The purpose of the CPA is to achieve "co-benefits"; where both the global environmental aim to reduce greenhouse gas emissions and the local social and economic needs are met. Promoting the implementation of composting through this CPA contributes to the sustainable development of XXX (specific area of the CPA) by bringing about the following economic, environmental, and social benefits:

Economic Benefits
- Investment from XXX*[Investing country(s)]* to the local economy
- Creation of job opportunities (e.g. in waste sorting and at composting facilities; XXX jobs) and potential stabilization of the volatile unemployment rate
- Capacity building of workers to develop viable skills (i.e. composting techniques and machinery operation) and provide information regarding health and safety measures
- Promotion of recycles and reuse of recyclables

Environmental Benefits
- Reduction of greenhouse gas emissions
- Improvement of sanitary conditions by presenting an alternative to dumping waste near households
- Improvement of soil quality due to the utilization of organic fertilizer and the reduction of chemical fertilizers
- Increase of waste collection that is mainly disposed improperly

Social Benefits

- Transfer of know-how on waste management and environmental technologies from XXX*[Investing country(s)]*
- Provision of alternative livelihoods to those currently working under hazardous conditions such as waste pickers[26] who make their livings by collecting and selling recyclable elements from dumping sites

A.3. Entity/individual responsible for the small-scale CPA:

Implementers for the CPA is/are XXX… and XXX. Among the implementers, the entity responsible for operation and management of composting facility is XXX. All the implementers will undertake waste collection within their municipalities and transport the collected waste to the composting facility.

- XXX *[Name of municipality]*
- XXX *[Name of municipality]*

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

The Dominican Republic

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The CPA site (composting facility) is located in the municipality of XXX. Latitude of the CPA site is N XX, XX'XX, and longitude is W XX, XX'XX. The address of the compost facility is provided below.

XXX, XXX,
XXX, the Dominican Repuclic

The waste collection for the facility operation will cover the municipalities of XXX … and XXX as shown in the following map.

[Illustrate the location of the CPA within the map below.]

[26] It is estimated that there are more than 200 waste pickers in Bohol Province based on investigation done by Bohol Provincial Government

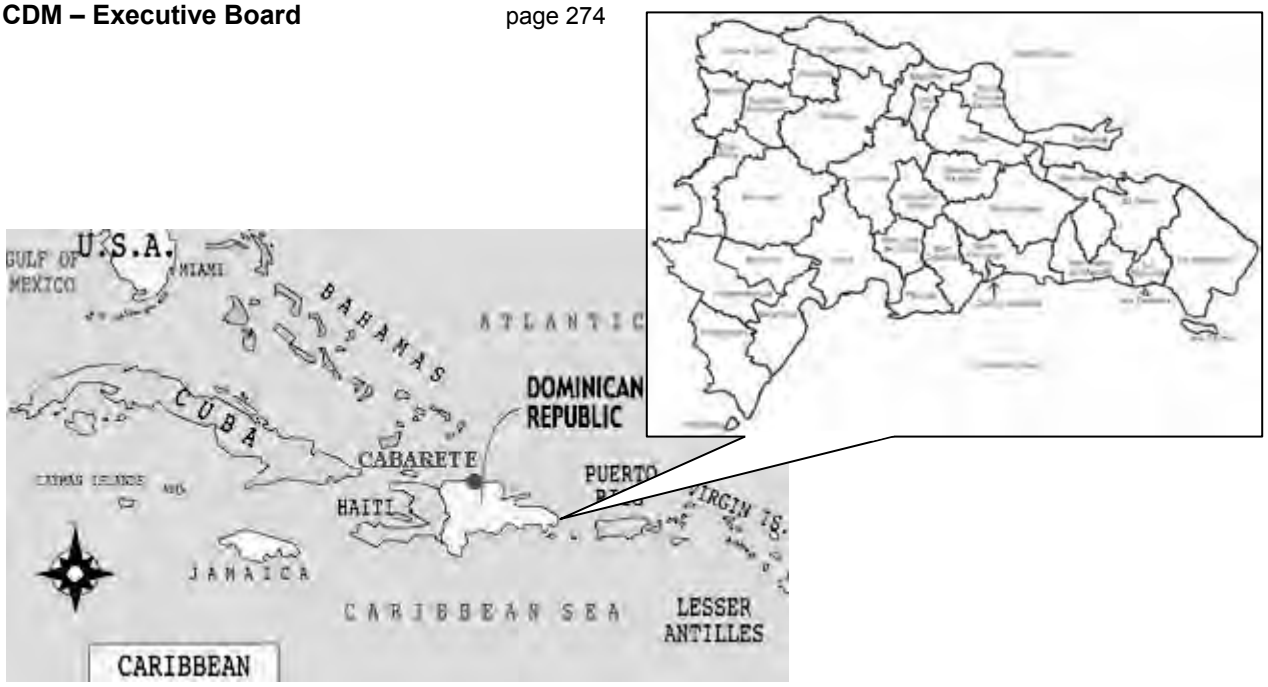


Figure 1. Location Map of the CPA Site and Waste Collection Coverage

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

This starting date of this CPA is dd/mm/2010, which is the same date as the proposed PoA.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

20years

A.4.3. Choice of the crediting period and related information:

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

The starting date of the crediting period is the registration date.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Table 1. Estimated amount of emission reduction

Years	Estimation of annual emission reductions (intCO_2e)
2010	XXX
2011	XXX
2012	XXX
2013	XXX
2014	XXX
2015	XXX
2016	XXX
Total emission reductions (tCO_2e)	XXX
Total number of crediting years	XXX
Annual average over the crediting period of estimated reductions (tCO_2e)	XXX

A.4.5. Public funding of the CPA:

No public funding is involved in this PoA and related CPAs and also this PoA does not include any diversion of ODA funds. *[#if any ODA fund is not involved in the project]*

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity with the following characteristics:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

[If the project participants are only part of this CPA:]
The project participant/s of the CPA is/are XXX. This CPA is the first and only CPA that XXX is part of. Therefore, it can be inferred that the CPA does not have the same project participants with any another CPAs (first criteria), thus verifying that the CPA is not a debundled component of another CPA.

[If the project participants are part of more than one CPAs, refer to A.4.4.1 (iii) of the proposed PoA for methods to verify that the CPA is not a debundled component and describe here.]

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

XXX*[name of CME]*, who is the managing entity of the PoA in which this CPA is under, will periodically obtain and update information regarding CDM project activities and PoAs related to composting. With this information, the Government of the Dominican Republic will verify prior to the implementation of the CPA that the small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA by confirming its geographic location does not correspond with any existing projects activities.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

Composting Programmatic CDM in the Dominican Republic

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

This CPA is eligible to be included in the registered PoA since it satisfies the criteria defined in A.4.2.2. in CDM-SC-PoA-DD of the registered PoA as described below.

Table 2. Applicability of the Proposed CPA

	Applicability conditions	Project case
1	A composting project to newly construct, or expand current, composting facility in order to treat organic waste materials that are otherwise treated through anaerobic fermentation in land fills	The activity of this CPA is applicable as described in A.2.
2	The produced compost is properly used for soil application	Applicable. Usage of the produced compost will be monitored.
3	The project satisfying the following condition · Establish that identified landfill(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or · Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill).	Applicable as the common practice for the organic waste in the Dominican Republic is disposal at landfill sites.
4	Located within the Dominican Republic	The activity of this CPA is applicable as described in A.4.1.2.
5	Achieves emission reductions of less than or equal to 60 kilotons CO2e/year per CPA	The activity of this CPA is applicable as the emission reduction achieved by this CPA is less than 60 kilotons CO_2 equivalent per year as shown in Table 1 in A.4.4.
6	Implements at least one of the technology options introduced in A.4.2.1	Applicable *[The technology to be applied is described here]*
7	Monitors and collects appropriate data on	Applicable (Describe confirmation to use the

	Applicability conditions	Project case
	the parameters listed in A.4.4.2	monitoring items listed in A.4.4.2)

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

In the absence of the CPA, organic waste materials are most likely to be disposed in legally allowable solid waste disposal sites in XXX*[name of CPA site]*, as is the current situation, resulting in the production and release of methane into the atmosphere. The CPA will reduce greenhouse gas emissions by avoiding the production of methane at dumpsites by composting the organic matter through an aerobic process instead of an anaerobic process.

According to the CDM-SC-PoA-DD of the registered PoA, the CPA would not have occurred due to the following investment barrier, technology barrier, barrier due to prevailing practice and other barriers.

j) Investment barrier:
Profits from sales of the compost are below the operation cost of the CPA
[Explanation on how the CPA meets the criteria]

k) Technology barrier:
A large-scale composting project that is operated by a group of municipalities or an entire city with a total solid waste generation of more than 50 tons/day (Type 3 CPA)
[Explanation on how the CPA meets the criteria]

l) Barrier due to prevailing practice:
Low adoption rate of composting facilities and most organic waste materials are being treated at dump sites. There are only XXX composting facilities reported within the country and most of them are pilot scale.

m) Other barriers: Access-to-finance barrier
Letter from financing banks that mentioning that CDM is the crucial factor for them to approve the loan.

n) Legal Barrier
The current practice of the waste treatment system at swine industry in the Dominican Republic is in accordance with the existing laws and regulations of the country, and there is no mandate or incentive for swine farmers to implement the proposed project activity in the Dominican Republic, which causes legal barrier for the implementation of the proposed project activity.

o) Other barriers:
Without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.
[Explanation on how the CPA meets the criteria]

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.
>>

The project boundary for the CPA is illustrated in the following figure. The boundary includes the municipal disposal site, composting facility site and application site of XXX.

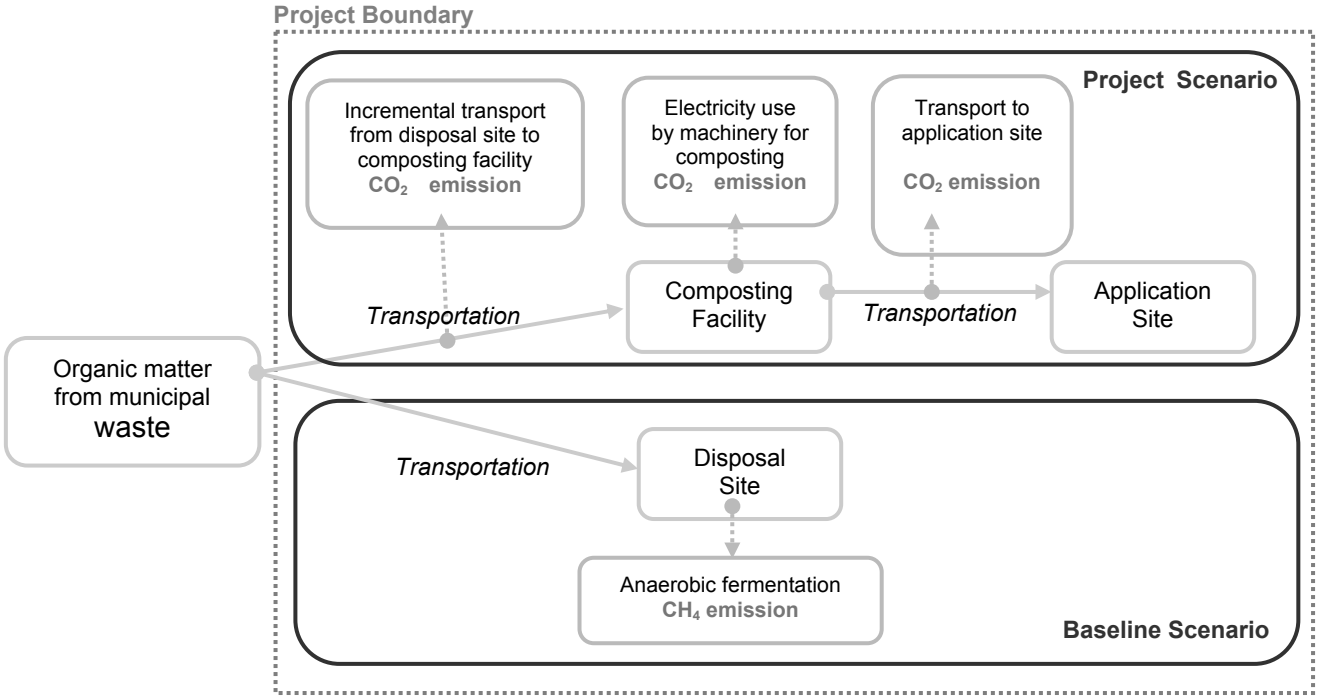


Figure 2. Layout of CPA Boundary

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

The detail information on the data and parameters not requiring monitoring are as described as follows. For data and parameters used for ex-ante calculation but need to be monitored after project implementation are shown in Annex 3.

Data / Parameter:	ϕ
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Any comment:	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase

	models was assessed to be 18%. Given the uncertainties associated with the model, and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied.
Value applied:	Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites.
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values recommended in "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)"
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	DOC_f
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default value since no local values are available
Any comment:	

Data / Parameter:	DOC_j
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type *j*
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted

	from Volume 5, Tables 2.4 and 2.5)
Value applied:	Wood and wood products: 43 Pulp, paper and cardboard: 40 Food and food waste: 15 Textiles: 24 Garden and park waste: 20 Glass, plastic, metal and inert waste: 0
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values for wet base waste since no local values are available
Any comment:	

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type *j*
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value applied:	<table><tr><th></th><th>Tropical dry</th><th>Tropical wet</th></tr><tr><td>Pulp, paper, cardboard</td><td>0.045</td><td>0.07</td></tr><tr><td>Wood and wood products:</td><td>0.025</td><td>0.035</td></tr><tr><td>Other (non-food) putrescible garden and park waste</td><td>0.065</td><td>0.17</td></tr><tr><td>Food, f ood waste, sewage sludge, beverages and tobacco</td><td>0.085</td><td>0.40</td></tr></table>
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values for wet tropical climate since no local data was available. The mean annual temperature is 25 centigrade [27] (>20 centigrade), and hence, the category of the area is "Tropical dry" or "Tropical wet" *[select whether the area is dry or wet]* in the table above as the mean annual precipitation in the province where the CPA is located is XXX mm (> or < 1000 mm) *[select inequality sign ">" or" <"]*.
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	▪ 1.0 for **anaerobic managed solid waste disposal sites**. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste.

[27] BBC whether (also cross checked by the data from the Oficina de Medico(ONAMET) of observation stations)

	▪ 0.8 for **unmanaged solid waste disposal sites – deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. · 0.4 for **unmanaged-shallow solid waste disposal sites.** This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 meters.
Justification of the choice of data or description of measurement methods and procedures actually applied:	The default values are given by "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)". The Government of Dominican Republic conducted field visits to landfill sites of each municipality in November 2007.
Any comment:	

Data / Parameter:	$MD_{y,reg}$
Data unit:	-
Description:	Methane that would be destroyed or removed in the year "y" for safety or comply with regulation.
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	No national/local regulations exist which enforce recovery or removal of landfill gas.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for raw waste collection
Source of data used:	Incremental collection distance between dumpsite and composting facility
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km/truck
Description:	Average distance for compost transportation
Source of data used:	Based on typical transportation distance in municipalities
Value applied:	To be measured by each CPA operating agency
Justification of the choice of data or description of measurement methods and procedures actually applied:	Most probably the actual end users of the compost will not be known ex ante, therefore an average value will be estimated depending on the local conditions of each CPA.

Any comment:	

Data / Parameter:	$EFCO_2$
Data unit:	$kgCO_2/km$
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Table 1-28, p.1.71 and Table 1-31, p. 1.74.
Value applied:	Light duty gasoline trucks: 0.579 Light duty diesel trucks: 0.331
Justification of the choice of data or description of measurement methods and procedures actually applied:	The figure will be determined depending on the trucks to be used at each CPA.
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e / tCH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	Decisions under UNFCCC and the Kyoto Protocol
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied:	A value of 21 is to be applied for the first commitment period of the Kyoto Protocol
Any comment:	After first commitment period of the Kyoto Protocol, the figure should be reviewed under decisions under UNFCCC.

Data / Parameter:	f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	This project does not involve methane recovery.
Any comment:	

Data / Parameter:	$B_{0,ww}$
Data unit:	kg CH4/kg.COD
Description:	Methane producing capacity of the wastewater
Source of data used:	SCC-AMS III.F(Ver8), FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	0.21
Justification of the choice of data or description of measurement methods and	Standard value recommended by UNFCCC

procedures actually applied:	
Any comment:	

Data / Parameter:	**$MCF_{ww,treatment}$**
Data unit:	0.2
Description:	Methane correction factor for the wastewater treatment system where the runoff water is treated.
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	Discharge of wastewater to sea, river or lake 0.1 Aerobic treatment, well managed 0 Aerobic treatment, poorly managed or overloaded 0.3 Anaerobic digester for sludge without methane recovery 0.8 Anaerobic reactor without methane recovery 0.8 Anaerobic shallow lagoon (depth less than 2 metres) 0.2 Anaerobic deep lagoon (depth more than 2 metres) 0.8 Septic system 0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC for the facility to be installed
Any comment:	

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	SCC-AMS III.F(Ver8)
Value applied:	1.06
Justification of the choice of data or description of measurement methods and procedures actually applied:	Standard value recommended by UNFCCC
Any comment:	

Data / Parameter:	**EF_{grid}**
Data unit:	$kgCO_2e/kWh$
Description:	Emission factor of the grid power
Source of data used:	Calculated based on the "Tool to calculate the emission factor for an electricity system"
Value applied:	0.7391
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on the public data derived from the "Determinación de la Línea Base de las Emisiones de Gases de Efecto Invernadero del Sector Eléctrico Nacional", Universidad nacional pedero henriques Urena Unphu (Aug.2009).
Any comment:	

Data / Parameter:	**NCV_{fuel}**
Data unit:	TJ/kt
Description:	NET Calorific value of the fuel of the fuel used

Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 43.0 Residual Fuel Oil: 40.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

Data / Parameter:	**EF_{fuel}**
Data unit:	tCO_2/TJ
Description:	CO_2 Emission factor of the fuel used
Source of data used:	IPCC default value
Value applied:	Gas/Diesel Oil: 74.1 Residual Fuel Oil: 77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data will be obtained by "the 2006 IPCC Guidelines for National Greenhouse Gas Inventories"
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

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(xiv) Baseline Emissions

Baseline emissions were calculated by equation (1).

$$BE_y = BE_{CH4,SWDS,y} - MD_{reg,y} \times GWP_{CH4} + MEP_{y,ww} \times GWP_{CH4} + BE_{CH4,manure,y} \quad \ldots(1)$$

Where:

Parameter	Description	Figure	Unit	Data Source
BE_y	Baseline emissions in year "y"	Calculated by equation (1)	tCO_2e	-
$BE_{CH4,SWDS,y}$	Methane emissions avoided during year "y" from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year "y"	Calculated by equation (2)	tCO_2e	-
$MD_{reg,y}$	Amount of methane that would have to be captured and combusted in the year "y" to comply with the prevailing regulations	0	-	No regulations both in Dominican Republic requiring methane capture and/or combustion
$MEP_{y,ww}$	Methane emission potential in the year "y" of the wastewater. The value of this term is zero if co-composting of wastewater is not	0	-	The project activity does not include co-composting

	included in the project activity			
CH_4_GWP	Global Warming Potential (GWP) of methane, valid for the relevant commitment period	21	tCO_2e/tCH_4	Decisions under UNFCCC and the Kyoto Protocol
$BE_{CH4,manure,y}$	Where applicable, baseline emissions from manure composted by the project activities, as per the procedures of AMS-III.D	0	tCO_2e	Animal manure will not be used in the proposed project activity

Parameters required for the calculation of equation (1) are determined as follows:

- $BE_{CH4,SWDS,y}$: Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year y ($t\ CO_2e$)

Methane emissions from disposal site without the CPA is determined utilizing the following equation provided in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site," which has been revised at Executive Board (EB) 35.

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1 - e^{-k_j}\right) \quad \ldots(2)$$

Where:

Parameter	Description	Figure	Unit	Data Source
ϕ	Model correction factor to account for model uncertainties	0.9	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)	0.1 (for managed solid waste disposal sites) 0 (for other types of solid waste disposal sites)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
F	Fraction of methane in the SWDS gas (volume fraction)	0.5	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose	0.5	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
MCF	Methane correction factor	1.0 (for anaerobic managed solid waste disposal sites) 0.8 (for unmanaged solid waste disposal sites – deep and/or with high water table) 0.4 (for unmanaged-shallow solid waste disposal sites)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
DOC_j	Fraction of degradable	Wood and wood products: 43	-	IPCC 2006 Guidelines for

	organic carbon (by weight) in the waste type j	Pulp, paper and cardboard: 40 Food and food waste: 15 Texitile: 24 Garden and park waste: 20 Glass, plastic, metal and inert waste: 0		National Greenhouse Gas Inventories
k_j	Decay rate for the waste type j	Pulp, paper, cardboard: 0.045(dry),0.07(wet) wood and wood products: 0.025(dry),0.035(wet) Other (non-food) putrescible garden and park waste: 0.065(dry),0.17(wet) Food, food waste, sewage sludge, beverages and tobacco: 0.085(dry),0.4(wet)	-	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
x	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)	-	-	-
y	Year for which methane emissions are calculated	-	-	-

The more detail information on the each parameter is described in B.5.1.
For the extension of the crediting period, the most updated "IPCC Guidelines for National Greenhouse Gas Inventories" will be referred for figures regarding OX, F, DOC_f, MCF, DOC_j, k_j, GWP.

■ $W_{j,x}$: Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x*
Where different waste types j are prevented from disposal, determine the amount of different waste types ($W_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$W_{j,x} = W_x \times \sum_{n=1}^{z} P_{n,j,x} \quad \ldots(3)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in the year x	Refer to Annex 3	tons	Calculated by the statistical data of the Dominican Republic Government
W_x	Total amount of organic waste prevented from disposal in year x	Refer to Annex 3	tons	Calculated by the statistical data of the Dominican Republic Government
$P_{n,j,x}$	Weight fraction of the waste type j in the sample n collected during the year x	Refer to Annex 3	-	Calculated by the statistical data of the Dominican Republic Government
Z	Number of samples collected during the year x	1	-	-

■ W_x : Total amount of organic waste prevented from disposal in year x

As indicated in equation (4) below, the generation volume of organic wastes (W_x) was calculated by multiplying the average per capita waste generation volume (XX kg/person/day) by the total population in the Dominican Republic.

$$Wx = POP_x \times WC_x \times CR_x \quad \ldots(4)$$

Where:

Parameter	Description	Figure	Unit	Data Source
POP_x	Population of the related municipalities in year x	Refer to Annex 3	tons	The statistical data of the Dominican Republic Government
WC_x	Per capita garbage production in year x	XX	kg/person/day	Mean value of the Dominican Republic by the statistical data of the Dominican Republic Government
CR_x	Percent of garbage collected in year x	Refer to Annex 3	-	Data obtained from the related municipality

However, for municipalities with self-produced waste management assessments available, waste generation volumes were calculated utilizing figures from the local assessments

(xv) Project Emissions

Emissions from the CPA are the sum of the emissions from incremental transportation and electricity or diesel consumption due to the CPA, as described in the following equation.

$$PE_y = PE_{y,transp} + PE_{y,power} + PE_{y,phy\ leakage} + PE_{y,comp} + PE_{y,runoff} + PE_{y,res\ waster} \quad \ldots(5)$$

Where:

Parameter	Description	Figure	Unit	Data Source
PE_y	Project activity emissions in the year "y"	Calculated by equation (5)	t CO_2/y	-
$PE_{y,transp}$	Emissions from incremental transportation in the year "y"	Calculated by equation (6)	t CO_2/y	-
$PE_{y,power}$	Emissions from electricity or diesel consumption in the year "y"	Calculated by equation (7) or (7)'	t CO_2/y	-
$PE_{y,phy\ leakage}$	In case of anaerobic digestion: methane emissions from physical leakages of the anaerobic digester in year "y"	0	t CO_2/y	Not included in the calculation as anaerobic digestion of biomass is not involved in the proposed project activity.
$PE_{y,comp}$	In case of composting: methane emissions during composting process in the year "y"	Calculated by equation (8)	t CO_2/y	-
$PE_{y,runoff}$	In case of composting: methane	Calculated by	t CO_2/y	-

	emissions from runoff water in the year "y"	equation (9)		
$PE_{y,res\ waster}$	In case residual waste/slurry/ products are subjected to anaerobic storage or disposed in a landfill: methane emissions from the anaerobic decay of the residual waste/products	0	t CO_2/y	Not included in the calculation as no residual waste/slurry/ products are treated by anaerobic storage or disposed in a landfill

Parameters utilized to calculate equation (5) are determined as follows:

■ $PE_{y,transp}$: Emissions from incremental transportation in the year "y")

$$PE_{y,transp} = (Q_y/CT_y) \times DAF_w \times EF_{CO2} + (Q_{y,comp}/CT_{y,comp}) \times DAF_{comp} \times EF_{CO2} \quad \ldots (6)$$

Where:

Parameter	Description	Figure	Unit	Data Source
Q_y	Quantity of waste composted in the year "y"	Refer to Annex 3	tons	The statistical data of Dominican Republic Government
CT_y	Average truck capacity for waste transportation		tons/truck	
DAF_w	Average incremental distance for solid waste and/or wastewater transportation		km/truck	
EF_{CO2}	CO_2 emission factor from fuel use due to transportation	Light duty gasoline trucks: 0.579 Light duty diesel trucks: 0.331	kg CO_2/km	IPCC default values
$Q_{y,comp}$	Quantity of final compost product produced in the year "y"	Refer to Annex 3	tons	-
$CT_{y,comp}$	Average truck capacity for final compost product transportation		tons/truck	
DAF_{comp}	Average distance for final compost product transportation		km/truck	

■ $PE_{y,power}$: Emissions from power usage in the year "y"

If the proposed CPA consumes any power for compost production, $PE_{y,power}$ will be calculated by power consumption by the composting facilities in kWh/year($Electricity_y$) and the electricity emission factor. For the case where national grid electricity is used, $PE_{y,power}$ is calculated by Equation (7), for composting facilities that use on-site generator, $PE_{y,power}$ is calculated by Equation (7)'.

$$PE_{y\ power} = Electricity_y \times EF_{grid} \quad \ldots (7)$$

$$= Electricity_y \times Fuel \times NCV_{fuel} \times EF_{fuel} \quad \ldots (7)'$$

Where:

Parameter	Description	Figure	Unit	Data Source
$Electricity_y$	Annual electricity consumption	XXX	kWh/y	Assumption by project proponent
EF_{grid}	Emission factor of the grid power	0.7391	$kgCO_2e$/ kWh	"Determinación de la Línea Base de la s Emisiones de Gases de Efecto Inver nadero del Sector Eléctrico Nacional", Universidad Nacional Pedro Henriquez Urena Unphu, (Aug, 2009)
Fuel	Annual fuel consumption	XXX	tons/year	Assumption by project proponent
NCV_{fuel}	net calorific value of fuel used	**Gas/Diesel Oil: 43.0** Residual Fuel Oi l:40.4	TJ/kt	IPCC default values
EF_{fuel}	CO_2 emission factor of fuel used	**Gas/Diesel Oil: 74.1** Residual Fuel Oil: 77.4	$tCO2_e$/TJ	IPCC default values

■ $PE_{y,comp}$:

Default emission factor for composting ($EF_{composting}$) of organic waste and/or manure (tCH4 /ton waste treated) provided in IPCC are 10gCH4/kg waste treated on a dry weight basis and 4gCH4/kg waste treated on a wet weight basis. While, $EF_{composting}$ can be set to zero for the portions of Qy for which the monitored oxygen content of the composting process is above 8%. This can be done via sampling with maximum margin of error of 10% at a 95% confidence level. For this purpose a portable oxygen meter can be used with lancets of at least 1 m length. In the case of forced aerated in-vessel and forced aerated pile composting systems continuous measurements may also be done using online sensors.

For CPAs under the PoA that do not monitor oxygen meter, the IPCC default value will be applied as described in the following equation:

$$PE_{y,composting} = Q_y \times EF_{composting} \times GWP_{CH4} \quad \ldots(8)$$

Where:

Parameter	Description	Figure	Unit	Data Source
Q_y	Quantity of waste composted and/or wastewater co-composted in the year "y"	XXX	t/y	Assumption by project proponent
$EF_{composting}$	Emission factor for composting of organic waste and/or manure	0.01(dry waste) 0.004(wet waste	tCH4/ton waste treated	IPCC default values
GWP_{CH4}	Global Warming Potential of methane, valid for the relevant commitment period	XXX	tCO_2e/tCH_4	Assumption by project proponent

■ $PE_{y,runoff}$:

$$PE_{y,runoff} = Q_{y,ww,runoff} \times COD_{y,ww,runoff} \times B_{0,ww} \times MCF_{ww,treatment} \times UF_b \times GWP_{CH4} \quad \ldots(9)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$Q_{y,ww,runoff}$	Volume of runoff water in the year y	XXX	m3/y	Assumption by project proponent
$COD_{y,ww,runoff}$	Chemical oxygen demand of the runoff water leaving the composting facility in the year y	XXX	t/m3	Assumption by project proponent
$B_{0,ww}$	Methane producing capacity of the wastewater	0.21	kgCH4/kg.COD	IPCC default value
$MCF_{ww,treatment}$	Methane correction factor for the wastewater treatment system where the runoff water is treated	0.2	-	SSC-AMS III.F (Ver8)
UF_b	Model correction factor to account for model uncertainties	1.06	-	SSC-AMS III.F (Ver8)
GWP_{CH4}	Global Warming Potential of methane, valid for the relevant commitment period	21	tCO_2e/tCH_4	IPCC default value

(xvi) Leakage Emissions

Emissions from leakage are calculated when composting facilities are transferred from other activities or existing composting facilities are transferred into other activities. Leakage emissions are 0 since this CPA does not transferred any facilities from other activities.

(xvii) Emissions Reduction of Greenhouse Gas

GHG emissions reduction is calculated as indicated in equation (10).

$$ER_y = (BE_y - (PE_y + Leakage_y) \quad \ldots (10)$$

The emissions reduction achieved by the CPA activity in the case of increase of capacity utilization of existing composting facilities will be measured as the difference between the baseline emission and the sum of the CPA emission and leakage.

$$ER_y = (BE_y - PE_y) \times (1\text{-}r) \quad \ldots (11)$$

The value for r is determined as follows:

$$r = WCOM_{BAU}/TWCOM_y \quad \ldots (12)$$

Where:

Parameter	Description	Figure	Unit	Data Source
$WCOM_{BAU}$	Reregistered annual amount of waste composted at the facility on a BAU basis calculated as the highest amount of annual compost production in the last five years prior to the project implementation	XXX	tons	Assumption by project proponent
$TWCOM_y$	Total quantity of waste composted in a year at the facility	-	tons	Monitored daya

B.5.3. Summary of the ex-ante estimation of emission reductions:

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Table 3. Summary of ex-ante estimation of emission reduction

Year	Estimation of project activity emissions (tCO_2 e)	Estimation of baseline emissions (tCO_2 e)	Estimation of leakage (tCO_2 e)	Estimation of overall emission reductions (tCO_2 e)
2010	XXX	XXX	0	XXX
2011	XXX	XXX	0	XXX
2012	XXX	XXX	0	XXX
2013	XXX	XXX	0	XXX
2014	XXX	XXX	0	XXX
2015	XXX	XXX	0	XXX
2016	XXX	XXX	0	XXX
Total (tCO_2e)	XXX	XXX	0	XXX

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

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(v) Monitoring and reporting framework

Monitoring and reporting framework is shown in the Figure 3 below. The compost facility operator carries out the operation and management of composting facilities. Based on monitoring manual that is provided the Government of Dominican Republic, XXX municipalities will monitor the average load of trucks for transportation of the waste and compost facility operator will monitor the operation of the facility and report to XXX *[name of CME]*, who will then undertake data checking, calculation of emission reduction, site visits and provision of advice to the municipalities. XXX *[name of CME]* will also be responsible for communication with Designated Operational Entity (DOE) for verification procedures. Items monitored by XXX *[name of CME]* are included in the figure below.

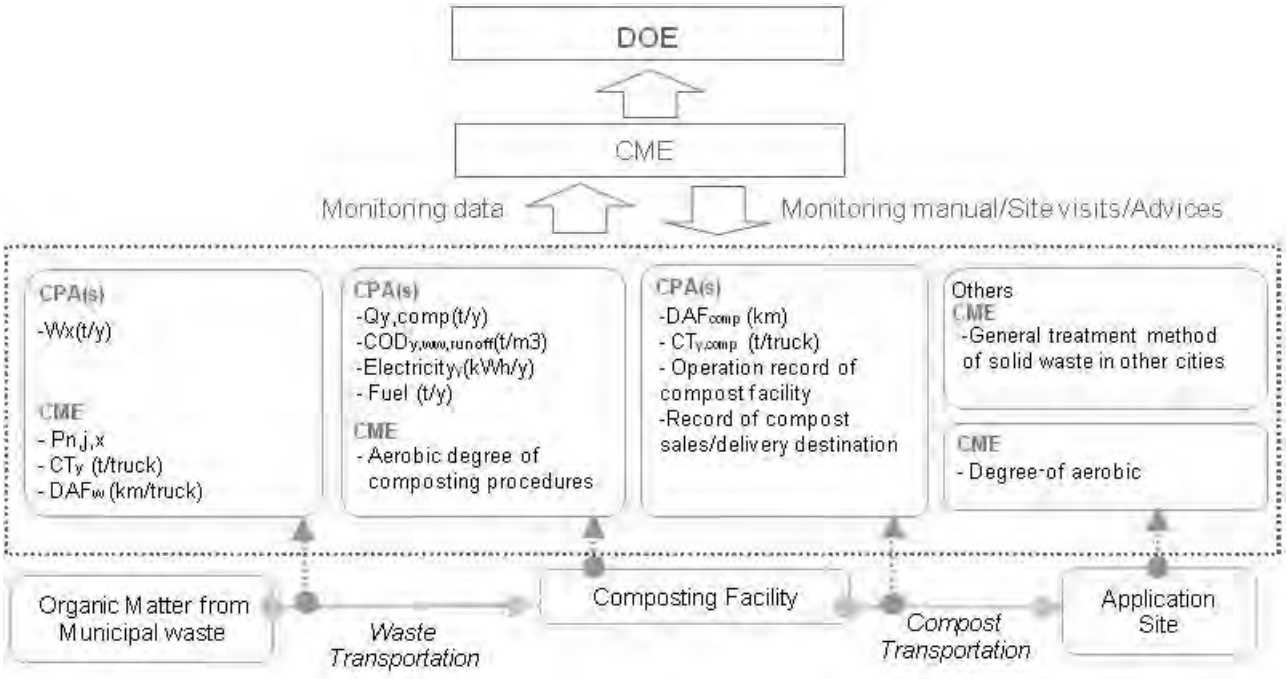

Figure 3. Monitoring plan for this CPA

(vi) Monitoring method
The detail information of the monitoring items and their monitoring method are described below.

Data / Parameter:	W_x
Data unit:	tons/year
Description:	Total amount of organic waste prevented from disposal in year x (tons)
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	[Type 1] For small-scale project (Type1), measurement will be taken by the compost facility operator. The weight will be estimated by the volume and the density of the waste. For Type 1 CPA, measurement by number of bags (boxes) used for transporting organic waste can be used. In this case, the mean weight of a bag (box) filled with organic waste shall be measured and used. [Type2, 3] All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. [Type1~3] Measurements will be conducted daily and the data is recorded and compiled in either digital or analogue format. The data will be sent regularly (at least

	annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used for measurement. Procedures will include regular calibration of scales since error could increase if scales are not calibrated.
Any comment:	

Data / Parameter:	$Q_{y,comp}$
Data unit:	tons/year
Description:	Quantity of compost produced in the year
Source of data to be used:	Measurements undertaken by the composting plant operator of each CPA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	All the collected organic wastes will be weighed by each composting facility operator using scales on site before the material is transferred to composting process. For Type 1 CPA, measurement by number of bags (boxes) for organic waste transportation can be used. In this case, the mean weight of a bag (box) filled with organic wastes shall be measured and used as measurement unit. Measurements will be conducted daily the composting facility operator of each CPA and the data is recorded and compiled in either digital or analogue format by them. The data will be sent regularly (at least annually) to XXX*[#CME's name]* for checking and computation.
QA/QC procedures to be applied:	Potential error is low. Commercially available scales will be used and regular calibration of scales will be done in order to avoid error increase.
Any comment:	

Data / Parameter:	$P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected during year x
Source of data to be used:	Sampling by the municipal engineer in each municipality
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]* using proper equipment for weight fraction measurement will conduct sample measurement quarterly. Waste types include: (i) Pulp, paper, cardboard (other than sludge), textiles (ii) Wood, wood products and straw; (iii) Other (non-food) organic putrescible garden and park waste and (iv) Food, food waste, sewage sludge, beverages and tobacco in accordance with the waste types in IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
QA/QC procedures to be applied:	Potential error is low. Each municipality shall take sufficient samples to ensure a maximum uncertainty of 20% at a 95% confidence level. Regular calibration

	will be conducted and technical engineers will ensure proper procedures of sampling.
Any comment:	

Data / Parameter:	CT_y
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for waste transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	XXX*[#CME's name]* will record the capacity of truck to be used for waste transport annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for solid waste transportation.
Source of data to be used:	Based on the distance of waste transportation by comparing the current waste transportation of related municipalities and the waste transportation plan developed for each CPA.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Incremental distance will be monitored using odometer by XXX*[#CME's name]* based on the current waste transportation distance and the waste transportation plan developed for each CPA.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	DAF_{comp}
Data unit:	km
Description:	Distance for destination of compost materials to be transferred
Source of data to be used:	Based on the mean distance from the composting facility to destination of the compost materials and the frequency of transport
Value of data applied for the purpose of	XXX

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Distance will be estimated using rout map from the composting facility to destinations of the compost material. The destination and the frequency will be recorded by the composting facility operator of each CPA. The data will be gathered by XXX*[#CME's name]* annually.
QA/QC procedures to be applied:	Potential error is low.
Any comment:	

Data / Parameter:	$CT_{y,comp}$
Data unit:	tons/truck
Description:	Average truck capacity for waste transport
Source of data to be used:	Based on the size of trucks to be used for compost material transport
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Composting facility operator will monitor and record the capacity of the truck to be used for compost transport. XXX*[#CME's name]* will gather the data annually.
QA/QC procedures to be applied:	Potential error is low. The capacity data will be obtained by the record provided by the manufacturer.
Any comment:	

Data / Parameter:	$COD_{y,ww,runoff}$
Data unit:	Ton/m3
Description:	Chemical oxygen demand of the runoff water leaving the composting facility in the year y
Source of data to be used:	On-site sampling (Onsite Technicians/Workers)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Sampling will be done on-site and analysis will carried out at an off -site lab adhering to internationally accepted standards and archived electronically. Monthly average values will be used for the estimation of emissions.
QA/QC procedures to be applied:	The data will be cross-checked with samples analyzed by an external accredited laboratory once in 3 months.
Any comment:	

Data / Parameter:	Aerobic degree of composting procedures
Data unit:	-
Description:	Based on the aerobic degree of the waste during composing process.
Source of data to be used:	Analysed data of the samples taken at composting facilities
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Samples of the waste under composting will be taken four times a year by XXX*[#CME's name]* to measure the aerobic degree of the composting process. The sample taking and the analyzing method will be based on the proper procedures under provision of technical engineers.
QA/QC procedures to be applied:	Potential error is low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Soil application method to ensure aerobic condition of the compost.
Data unit:	-
Description:	Aerobic condition of the compost soil application
Source of data to be used:	Based on the soil application condition of the compost after distribution to the end users
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The soil application method of each destination will be briefly recorded when if is distributed/sold to the end user by composting facility operator of each CPA. XXX*[#CME's name]* will gather the data annually and the spot check to take samples to analyse aerobic degree of the compost will be conducted quarterly by XXX*[#CME's name]*.
QA/QC procedures to be applied:	Potential error will be low since the analysis will be conducted in a proper laboratory of the third party.
Any comment:	

Data / Parameter:	Presence of a methane recovery facility at disposal site used by municipality
Data unit:	-
Description:	Demonstration that the amount of waste composted in the project activity facilities would have been disposed in a solid waste disposal site without methane recovery
Source of data to be used:	Site visits to disposal sites by XXX*[#CME's name]*
Value of data applied for the purpose of calculating expected	-

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Observation of the presence or absence of a gas collection and use facility.
QA/QC procedures to be applied:	Potential error is not expected
Any comment:	

Data / Parameter:	**$Electricity_y$**
Data unit:	kWh/y
Description:	Annual electricity consumption
Source of data to be used:	Based on the electricity requirement of the composting facility assumed by the project proponent
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Power consumption will be monitored by electricity meter in kWh on a monthly basis. XXX*[#CME's name]* will gather data annually.
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

Data / Parameter:	**Fuel**
Data unit:	tons/year
Description:	Annual fuel consumption for onsite power generation assumed by the project proponent
Source of data to be used:	Based on the amount of electricity consumption and bills of purchasing the fuel
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods and procedures to be applied:	Fuel consumption will be recorded by fuel purchase bill compiled by composting facility operator of each CPA. XXX*[#CME's name]* will gather data annually.
QA/QC procedures to be applied:	Potential error is not expected.
Any comment:	

C.1. Please indicate the level at which environmental analysis, as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

[The contents of the analysis of environmental impacts will be provided here.]

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

[Whether or not the environmental impact analysis will be required to the CPA in accordance with the Department Administrative Order (DAO) 2003-30 will be described here.]

SECTION D. Stakeholders' comments

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D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☒ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

As indicated in the proposed PoA, a public consultation was held at the PoA level where representatives from the National Environmental Agency (DENR), Bohol Provincial Government, municipalities, research institutions, universities and environmental NGOs were invited and given the opportunity to discuss and provide comments to the PoA.

In addition to the public consultation at the PoA level, CPAs will invite and compile comments from local citizens by hosting a public consultation at the CPA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

[Provide a brief description how public consultations for local citizens are held and how comments from them are collected.]

D.3. Summary of the comments received:

[Comments from local citizens should be collected and summarized here.]

D.4. Report on how due account was taken of any comments received:

[The report on how the comments were received should be described here.]

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE small-scale CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this PoA and related CPAs.

Annex 3

BASELINE INFORMATION

5.4

Table 4. Parameters Used to Determine OX and MCF

Municipality	Type of landfill managed by municipality	Depth of landfill	Level of water table	OX	MCF
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4
	Open dump or Controlled land fill	> or < 5m	high or low	0.1 or 1.0	1.0, 0.8 or 0.4

Source: Information provided by municipality and site observation

Table 5. Population Estimates in the First Crediting Period

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Source: Based on census 2000 of the Provincial of Bohol and the population increase data obtained by each municipality

Table 6. Estimated Waste Collection Ratio in the First Crediting Period [%]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7

Source: For xxx,… and xxx: Data from Solid Waste Management Assessment created by each municipalities, for other municipalities: Data obtained by each municipality

Table 7. Estimated Organic Waste Generation in the First Crediting Period [tons/day]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Source: Data obtained by each municipality

Table 8. Total Amount of Organic Waste Type *j* Prevented from Disposal ($W_{j,x}$) by the CPA [tons/day]

	wood	pulp	food	textiles	garden	others	total
Year1							
Year2							
Year3							
Year4							
Year5							

Year6							
Year7							
Total							

Table 9. Compost Production [tons/day]

Municipality	Year1	Year2	Year3	Year4	Year5	Year6	Year7
Total							

Note: Estimated compost yield from the organic waste is assumed as 0.4.

Table 10. Other Information Related to Baseline

Municipality	Compost facility is newly built or expansion of existing one	Landfill Gas Collection	…
	New or Expansion of existing	No	
	New or Expansion of existing	No	
	New or Expansion of existing	No	
Source			

Annex 4

MONITORING INFORMATION

Refer to Section B.6.1 for the Monitoring Information.

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