CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Baltra Cogeneration Project in the Galapagos (the "Project")

Document Version 01
Date of Completion: 5/March/2010

A.2. Description of the small-scale project activity:

The Project is a 5 MWe cogeneration power project on the Island of Baltra, the Galapagos Islands in Ecuador. The cogeneration plant will be fuelled by biofuel from jatropha seeds from the mainland. The electricity generated from the project will be fed into a mini-grid in the Island of Santa Cruz. Santa Cruz is the most populated island in the Galapagos with nearly one half of the population of the Galapagos, and one power station (Puerto Ayora Power Station) with diesel generators serving the daily demand.

The Project will be implemented under the Ecuadorian government's voluntary initiative "Zero Fossil Fuel for the Galapagos Islands" and will contribute to the sustainable development of the Galapagos Islands and will contribute to the protection of vulnerable ecosystems of the islands. Under the same initiative, there is a wind power plant project[1] on Baltra which will supply electricity to the same mini grid of the Santa Cruz from January 2011 onwards. This is complemented by diesel generators to assure electricity supply. The cogeneration plant is to take over the diesel generators so that the electricity supplied to the mini-grid will eventually be 100% based on renewable energy.

The heat from the cogeneration will be used at a desalination plant planned to be constructed next to the cogeneration plant to supply desalinated water to both Baltra and the island cruisers used for ecotourism. Under the current practice, the cruisers pass by Baltra, going to Puerto Ayora of Santa Cruz Island to pump water. By stopping cruisers to come around Santa Cruz island to reach Puerto Ayora, the project can further reduce the risk involved with boat accidents and oil leakage to harm the fragile ecosystem surrounding the islands.

The biofuel will be produced from jatropha seeds from trees currently used as hedges for housing and farm areas in the Province of Manabi, one of the poorest provinces in the Ecuador with a high percentage of farmers and husbandry population. Prior to the Zero Fossil Fuel initiative, the jatropha fruits did not have any commercial value, and they would naturally fall on the ground to rot. The Project will contribute to the improvement of the economic wellbeing of the region by devising a way to provide a new source of income to the impoverished rural communities by creating and securing a demand for biofuel. The Project has already attracted farmers' wives as employees, serving as a source of secondary income.

In addition, the Project is expected to contribute to the Galapagos's sustainable development in the following ways:

Environmental contribution

[1] The wind project is also under a process of obtaining CDM status.

- Significant reduction to eliminate emissions of VOCs from loading and unloading diesel used for power generation at the Puerto Ayora Power station
- Significant reduction of CO_2, SO_2, CO, PMs and NO_x emissions from the diesel generator at the power station
- Significant reduction of land contamination at the power station
- Less risk of oil spill and damage to the fragile ecosystem of the Galapagos by significantly reducing diesel use for the power generation

Economic contribution

- Alleviation of the fuel supply dependence on the mainland Ecuador by introducing the renewable energy on the islands
- Alleviate the poverty in the rural areas of the Province of Manabi by creating a demand for biofuel
- Bolstering the islands' global image as a model of sustainable life, serving as a showcase for tourism, the main income source for the island inhabitants

Social contribution

- Supplying safe, sweet water to Baltra and cruisers
- Reduction of noise from the power station, which is located in the capital city of the Santa Cruz
- Education campaign by raising awareness of the people on renewable energy and energy saving, with a common goal to achieve a completely sustainable energy system

The project is a first biofuel-powered cogeneration project in Ecuador.

A.3. Project participants:

Table 1: Table of project participant

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)
Ecuador (host)	**Fideicomiso Mercantil Energía Renovable para Galápagos** (Public entity)	Yes
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

See contact information in the Annex 1 of this PDD.

Fideicomiso Mercantil Energía Renovable para Galápagos is responsible for financing the renewable energy projects in the Galapagos Islands.

Energías Renovables para Galápagos (ERGAL) will be a designated as a responsible organization for the project implementation and CDM.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Ecuador

A.4.1.2. Region/State/Province etc.:

Island of Baltra, Galapagos Province

A.4.1.3. City/Town/Community etc:

Galapagos National Park

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The proposed project site is located on the Island of Baltra, in the Galapagos Islands, Ecuador.

Geographical coordinates:

P1(802260, 9951935), P2(802460, 9952045)
P3(802390, 9951935), P4(802190, 9952045)

Figure 1- Map of the Galapagos Islands (Courtesy of Wikipedia)

CDM – Executive Board

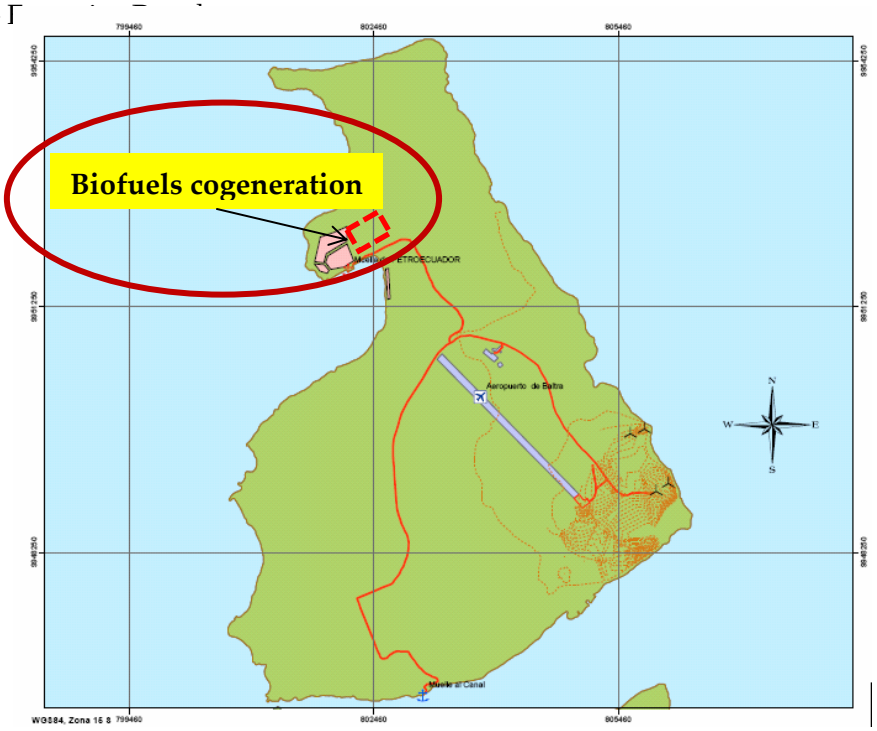

Figure 2- Map of the Island of Baltra and project site location

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

The Project activity falls under the following type and category:

AMS-I.C.
Type I: Renewable energy projects
Category C: Thermal energy production with or without electricity
Reference: Version 17 or after, Scope 1, in effect as of revised date

Technology Applied:

The proposed project activity is a 5 MWe biofuel fuelled cogeneration project, and it is expected to be under operation as of January, 2013. It will be installed close to the fuel storage terminal of Baltra, where biofuel will be transported by a pipeline.

Cogeneration characteristics

- Cogeneration modified for the combustion of biofuel from jatropha seeds
- Speed: 900 rpm
- Mep 6-9 cyl: 24.8 bar
- Heat rate: 8316 kJ/kWh
- Electricity generation efficiency of 30%
- Heat generation efficiency of 45%
- Equipment lifetime of at least 15 years

The equipment will be transported from abroad and mounted with special caution.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The project will be implemented with a renewable crediting period and renewed once.

Table 1 : Estimated emission reductions

Years	Estimation of emission reductions in tonnes of CO_2e
2013	6,975
2014	8,073
2015	9,220
2016	10,287
2017	11,395
2018	12,549
2019	13,747
Total estimated reductions (tonnes of CO_2e)	**72,246**
Total number of crediting years	14 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	10,321

A.4.4. Public funding of the small-scale project activity:

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The Project is not receiving any funds from Annex I countries, and therefore, it does not result in the diversion of official development assistance.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As defined in paragraph 2 of Appendix C of the SSC M&P, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a register small-scale CDM project activity or a request for registration by another small-scale project activity:

- By 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 proposed project activity is not a debundled component of any larger project activity as there is no other small-scale project activity that fulfils the abovementioned criteria.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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The approved baseline and monitoring methodology applicable to the project activity is as follows:

AMS-I.C.
Type I: Renewable energy projects
Category C: Thermal energy production with or without electricity
Reference: Version 17 or after, Scope 1, in effect as of revised date

B.2 Justification of the choice of the project category:

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The Project meets all the applicability conditions set forth by the methodology as presented below:

Table 3: Applicability conditions

	Applicability condition	Project case
1	This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	The Project is a cogeneration project, which displaces thermal energy to a desalination plant. Without the Project implemented as CDM, the desalination plant will install a boiler to generate thermal energy fuelled by diesel.
2	Biomass-based co-generating systems that produce heat and electricity are included in this category. For the purpose of this methodology "Cogeneration" shall mean the simultaneous generation of thermal energy and electrical and/or mechanical energy in one process. Cogeneration system may supply one of the following: (a) Electricity to a grid; (b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b).	The Project is a biofuel-based cogenerating system that produces both heat and electricity. The electricity is supplied to a mini-grid on the Island of Santa Cruz and the heat is supplied to a nearby desalination plant on the Island of Baltra. Therefore, the Project falls into a type (c) category of the applicability condition.
3	The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (see paragraph 5 for the applicable limits for cogeneration project activities).	The installed capacity of the unit is 5MWe (or 15 MWth) for the power generation, and the rated thermal energy generation capacity is 19.8 MWth. Total installed/rated thermal energy generation capacity is 19.8 MWth, and this is under the 45MWth threshold.
4	For co-fired systems, the total installed thermal energy	Not applicable. The Project is not a co-

	generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal.	fired system.
5	The following capacity limits apply for biomass cogeneration units: (a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e., for renewable project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant); (b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e., no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.	As mentioned above, the total installed energy generation capacity of the project equipment is 19.8 MWth, and it is under the small-scale project threshold.
6	In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	The heat produced by the project activity is delivered to a desalination plant outside of the project boundary. A contract will be signed during the plant construction period, stating that only the project participant of the cogeneration plant can claim emission reductions from the energy displaced by the desalination plant.
7	Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	Not applicable. The project activity does not involve retrofitting or modifying an existing facility for renewable energy generation.
8	The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the	Not applicable. The project activity is a Greenfield project and does not involve the addition of renewable energy units at an existing renewable energy facility.

	project should comply with capacity limits in paragraphs 3 to 5 and should be physically distinct from the existing units.	
9	Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: (a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g., source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.	Not applicable. The project activity does not involve charcoal based biomass energy generation.
10	Plant oil[2] based biomass energy generation project activities are eligible to apply the methodology by fulfilling the following conditions: (i) Plant oil is produced from renewable biomass sources and by pressing and filtering oilseeds (not trans-esterified).	The government of Ecuador allows only the biofuel from fruits from jatropha hedges to be used for the proposed project activity, which is produced from a simple pressing and filtering technology. It does not involve trans-esterification.
	(ii) If the project participants are not the producers of the plant oil, the project participants shall have access to sufficient data to calculate and perform monitoring of the emission reductions from the plant oil production. Under such cases, project participants (user of plant oil) shall be bound by a contract with producers of the plant oil that states clearly who is entitled to claim emission reductions resulting from its consumption.	The individual communities in the Province of Manabi will be in charge of running the extraction plants; therefore, the project participant is not the oil producer. The project participant will directly acquire the data from the communities to calculate the emission reductions. In addition, the project participant will collaborate with the communities to correctly perform the monitoring mentioned in the Section B.7.

[2] Plant oil, or vegetable oil, is oil of plant origin composed of triglycerides. Although many different parts of the plants may yield oil, most often oil is extracted from the seeds or fruits of the plant. Examples of plant oil are sunflower oil, rapeseed oil or jatropha oil.

	(iii) Under this methodology, only the CO2 emissions from fossil fuel displaced by plant oil are considered.	The project activity only accounts for the emission reductions achieved from displacing the diesel that would have been used in absence of the project implementation.
	(iv)In accordance with the approved "General guidance on leakage in biomass project activities" for small scale projects, the project participants should demonstrate that the area where the biomass is grown is not a forest (as per DNA forest definition) and has not been deforested, according to the forest definition by the national DNA, during the last 10 years prior to the implementation of the project activity. In the absence of forest definition from the DNA, definitions provided by relevant international organizations (e.g. FAO) shall be used. Biomass and/or wastes generated/used in the cultivation and processing of the oilseeds shall be properly treated or disposed of.	According to the Ecuadorian DNA, the forest definition is as follows: - A single minimum tree crown cover value: 30% - A single minimum land area value: 1 hectare - A single minimum tree height value: 5 metres The area where the biomass is grown is a residential area and farmland. It will not meet the forestry definition due to the fact that Jatropha trees are planted to serve as hedges in a linear way and they are scattered around the area (see aerial photograph of the Province of Manabi). Under the current practice, jatropha trees are kept to between 3 to 5 m heights.
	(v) Biomass and/or wastes generated/used in the cultivation and processing of the oilseeds shall be properly treated or disposed of.	There is no cultivation involved with the hedges. The wastes after extraction is either formed as a Jatropha cake to be used as a fuel source or used for land application.

B.3. Description of the project boundary:

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In accordance with the methodology AMS-I.C., the project boundary encompasses the followings:

- physical, geographical site of the project equipment producing the renewable energy delineates the project boundary.
- industrial, commercial or residential facility or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity
- geographical area of the cultivation, production, processing of oil-seeds and disposal of waste products.

This covers the project site on the island of Baltra, the desalination plant where the heat produced by the project activity is consumed, areas where jatropha trees are planted, and oil processing plant. Wastes from the processing plant will be reused or used for soil application.

B.4. Description of baseline and its development:

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< E- case >

The Project is implemented under the Ecuadorian voluntary initiative "Zero Fossil Fuel for the Galapagos Islands", which was launched in April, 2007. The Zero Fossil Fuel Initiative is a reaction of the tragic oil spill by the Tanker Jessica in 2001, which killed a huge population of sea iguanas and seriously damaged the vulnerable ecosystems in the Galapagos. As the name describes, this challenging initiative is to gradually decrease the fossil fuel consumption in the Galapagos to the zero level, especially in the power and transportation sectors.

For this reason, the Project is considered an E- case, where favourable conditions are given to promote sustainable energy after 2001. Therefore, the baseline will not take into consider the Zero Fossil Fuel Initiative.

< Baseline scenario >

Under the proposed CDM project activity, the electricity will be supplied to the existing mini-grid in the island of Santa Cruz and the heat will be supplied to a new desalination plant which will be installed next to the proposed project activity site. Since the desalination plant is a greenfield and there is no historical information available for heat generation, the baseline scenario will be selected, as per footnote 6 of paragraph 12 of AMS-I.C, by using the latest version of the Combined tool to identify the baseline scenario and demonstrate additionality (version 02.2). The baseline scenario for the electricity generation shall be the mini-grid electricity replacement of Santa Cruz.

Step 1: Identification of alternative scenarios

Step 1a: Define alternative scenarios to the proposed CDM project activity

According to the tool, identified alternative scenarios that provide outputs or services with comparable quality, properties and application areas as the proposed CDM project activity are as follows:

Alternative 1:	The proposed project activity not undertaken as a CDM project activity
Alternative 2:	The proposed project activity using diesel oil instead of biofuel
Alternative 3:	The electricity is generated by a diesel generator installed at the project site and the desalination plant will install a conventional boiler available in the local market and use diesel as fuel source
Alternative 4:	The electricity is generated by the existing diesel generators of the mini-grid and the desalination plant will install a conventional boiler available in the local market and use diesel as fuel source

Sub-step 1b: Consistency with mandatory applicable laws and regulations

All alternatives are in compliance with the legal and regulatory requirements in Ecuador.

Step 2: Barrier analysis

Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios

Two barriers are examined for the implementation of alternative scenarios:

- Investment barriers
- Operational barriers

Sub-step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

Alternative 1 is a first-of-its-kind and has a significant investment barrier, which will be further explained in Section B.5, and therefore, it is not a plausible scenario.

Alternative 2 also has a significant investment barrier, due to the fact that cogeneration technology for biofuel is not locally available, and requires the equipment to be imported from other countries.

Alternative 3 is a technically plausible alternative. However, the diesel generators still have their project life during the crediting period, and there is no need for the addition of a new diesel generator. Furthermore, installing the new diesel generator on the island of Baltra and not at the mini-grid station on the island of Santa Cruz is not cost-effective, and it is operationally illogical to have an isolated diesel generator on Baltra whose sole purpose is to supply the electricity to the mini-grid in Santa Cruz.

Alternative 4 is technically, financially, and operationally the most plausible alternative, since there is no additional investment required for electricity generation, and the boiler is readily available to meet the heat requirement for the desalination plant. Table 4 summarizes the result.

Table 4: Summary of the barrier analysis result

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Investment barrier	Yes	Yes	Semi-Yes	No
Operational barrier	No	No	Yes	No

As a conclusion, Alternative 4 is only scenario that is not prevented by any barrier.

Since Alternative 4 is not the proposed project activity undertaken without being registered as a CDM project activity, Alternative 4 is identified as the baseline scenario.

Step 4 Common practice analysis

The project is a first of its kind in Ecuador, and there are no similar activities existing or underway in Ecuador.

Therefore, the baseline scenario is Alternative 4, where the electricity is generated by the existing diesel generators of the mini-grid and the desalination plant will install a conventional boiler available in the local market and use diesel as fuel source.

The baseline scenario will be calculated in line with paragraph 12 (h) of AMS-I.C., where electricity is produced using fossil fuel and exported to the grid, and thermal energy (steam/heat) is produced using fossil fuel.

< Electricity generation >

The Project is a supplementary to the wind power plant, and the cogeneration plant will satisfy the demand by generating the difference between the demand on the mini-grid and the electricity generated by the wind power plant. In other words, the electricity output from the Project will be affected by 1) the growth of the demand and 2) the wind availability. Table xx shows the Ecuadorian government's forecasts for the future demand, together with the expected electricity generation by the wind and cogeneration plants.

Table 5: Future growth of the electricity demand on the Island of Santa Cruz and the expected electricity output from the wind power plant (MWh/year)

	Electricity Demand in Santa Cruz (forecast)	Electricity supplied from the wind project	Electricity replaced by the Project (baseline scenario)
2010	21,483	--	--
2011	22,578	4,800	--
2012	23,636	4,800	--
2013	24,700	17,640	7,060
2014	25,811	17,640	8,171
2015	26,973	17,640	9,333
2016	28,052	17,640	10,412
2017	29,174	17,640	11,534
2018	30,341	17,640	12,701
2019	31,554	17,640	13,914
2020	32,817	17,640	15,177
2021	33,965	17,640	16,325
2022	35,154	17,640	17,514
2023	36,384	17,640	18,744
2024	37,658	17,640	20,018
2025	38,976	17,640	21,336
2026	40,145	11,760	28,385
2027	41,350	11,760	29,590

As per paragraph 14 of AMS-I.C., the baseline is calculated using AMS-I.D.. Paragraph 9 of AMS-I.D. allows using the default emission factor for diesel generator systems shown in Table I.D.1, if the system is using exclusively fuel oil and/or diesel fuel. The Project activity involves replacement of a mini-grid electricity in the island of Santa Cruz, the Galapagos. The mini-grid is fed by one power station located in Puerto Ayora, where only diesel generators of the total installed capacity of 4.35MW are running 24 hours/day throughout the year.

Therefore, the emission factor is a mini-grid with 24 hour service for over 200kW in Table I.D.1, and the baseline emission is the annual kWh generated by the cogeneration project times an emission factor of 0.8 kg CO_2e/kWh.

< Heat generation >

For heat generation, as per paragraph 15 and 16, the baseline emission is calculated by using an efficiency of a new boiler available on the market in the country.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

In line with the Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the Project is deemed to be additional if it faces at least one of the following barriers:

(a) Investment barriers
(b) Technological barriers
(c) Barrier due to prevailing practice
(d) Other barriers

It is identified that the Project faces following barriers in implementation:

Technological barriers

The Project is the first cogeneration project with biofuel from jatropha seeds. The Galapagos, being an island as well as a UNESCO World Heritage Site, requires much more complex planning in installing the cogeneration plant than the projects in main land Ecuador. Technological barriers mentioned in this section causes a significant increase in the costs, which is discussed under the investment barrier section.

< Constraints in the choice of thermal power generation system and equipment suppliers with sufficient experience in powering with jatropha oil >

The main purpose of the Project is to supplement the gap between the demand and the electricity supplied by the wind plant of Baltra. This could be achieved by installing the biofuel-fed power generator. However, the need for thermal energy at the desalination plant required the installation of a cogeneration system, which significantly raised the initial investment cost due to its technological complexity.

A biofuel-fed generation system is in general considered technically more challenging than a biomass-fired power generation mainly due to possible clogging of the system which accelerates the deterioration of the equipment. In addition, biofuel varies significantly in their chemical characteristics, and being successful in using biofuel from one specific biomass source may be quite different from biofuel from another type of biomass source.

There are only a few equipment suppliers with sufficient experience in biofuel-fed thermal generation system. Furthermore, most of the equipment suppliers are from Europe and they lack experience in using

jatropha oil in the small size project, as in the case of the proposed project. This creates further complexity in operation of the cogeneration system and results in raising initial investment costs.

Investment barriers

<Economic and political situation in Ecuador >

Ecuador is an oil producing country; the government's budgetary source is heavily reliant upon the income from crude oil sales. The governmental budget is designed based on the forecast price of crude oil. For the year 2009 national budget, the reference oil price was set at 85 USD/bbl. However, the oil price later dropped to lower than 60 USD/bbl which significantly affected public investment in various projects.

As in any other country, publicly-funded projects are not risk-free, and it is under constant threat from fund shortage and cancellation of projects. In the Galapagos, for instance, the Ecuadorian government once planned a water desalination project using a 14 million USD loan from the Spanish government in 2004. However, an underestimation of the costs for civil works resulted in a shortfall of funds. The government recognized the need for redesigning a completely different system for the desalination project, and the project was cancelled in 2008. The proposed Project is facing the same situation as this desalination project, caused by the underestimation of the initial investment costs.

The situation for public financing has become even more difficult recently. In November 2009, Ecuador experienced a nation-wide power crisis due to a water shortage at the one of the main hydropower stations in the country. This has prompted the government to review the public power plan to accelerate construction of thermal power plants by cancelling some projects with designated funds. The Galapagos project is a small project and is not treated with the same priority as the thermal power plants, and the Project may not receive any additional financial resources until the government identifies a new funding source. This is specifically the reason why the project proponent decided to use the CDM to cover the initial investment costs.

< High initial investment cost >

As explained in the technological barrier section, having the project in the Galapagos (with high equipment transportation costs, labor costs, and additional costs to ensure minimal impact to the fragile ecosystem) and the financial constraints from having to install a more expensive cogeneration technology rather than a single-cycle power plant, made the initial investment cost extremely high.

Therefore, the project faces significant investment barriers.

Common Practice

There is no cogeneration project using biofuel in Ecuador, and this is a first-of-its-kind project in the country.

As clearly demonstrated, this project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission reductions associated with electricity displacement of the mini-grid of Santa Cruz Island

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(Equation 1)}$$

ER_y Emission reductions in year y (t CO_2e/y)
BE_y Baseline Emissions in year y (t CO_2e/y)
PE_y Project emissions in year y (t CO_2/y)
LE_y Leakage emissions in year y (t CO_2/y)

Baseline emissions

Baseline emission will be composed of the electricity supplied to the mini-grid of Santa Cruz and heat supplied to the desalination plant.

$$BE_y = BE_{ele,\,y} + BE_{heat,\,y} \quad \text{(Equation 2)}$$

Table 6: Baseline calculation

Parameter	Description	Value	Data Source
$BE_{ele\ y}$	Baseline emissions from the electricity generation in year y (t CO_2e/y)	Calculated	Equation 3
$BE_{heat,\,y}$	Baseline emissions from the heat generation in year y (t CO_2e/y)	Calculated	Equation 4

<Electricity-related baseline emissions>

The baseline emission for the electricity generation is calculated based on the electricity demand forecast of the Santa Cruz mini-grid, and as per paragraph 14 of AMS-I.C., it is equal to an expected amount of electricity generated by the cogeneration power plant times an emission factor of 0.8 kg CO_2e/kWh from the Table I.D.1 of AMS-I.D..

$$BE_{ele,y} = EG_y \, x \, EF_{y,\,grid} \quad \text{(Equation 3)}$$

Where:

Table 7: Baseline calculation for electricity

Parameter	Description	Value	Data Source
EG_y	Annual kWh generated by the Project in year y (kWh/y)	--	Preliminary technical evaluation study
$EF_{y,\,grid}$	The grid CO2 emission factor in year y (t	0.0008	Table I.D.1 of AMS-

	CO_2/kWh)		I.D.

<Heat-related baseline emissions>

The baseline emission for the heat generation is calculated based on paragraph 15 of AMS-I.C.

$$BE_{thermal, CO2, y} = (EG_{thermal, y} / \eta_{BL, Thermal}) * EF_{diesel, CO2} \quad \text{(Equation 4)}$$

Where:

Table 8: Baseline calculation for heat

Parameter	Description	Value	Data Source
$BE_{thermal,CO2, y}$	The baseline emissions from steam displaced by the project activity during the year y (tCO2e)	Calculated	--
$EG_{thermal, y}$	The net quantity of steam supplied by the project activity during the year (TJ)	--	Preliminary technical evaluation study
$\eta_{BL, Thermal}$	The efficiency of the boiler using fossil fuel that would have been used in the absence of the project activity	80%	The lowest energy conversion efficiency figures from 3 identified boiler manufacturers in Quito
$EF_{diesel, CO2}$	CO_2 emission factor of the fossil fuel that would have been used in the baseline plant (tCO_2/TJ) obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used	74.10	IPCC (2006) for diesel oil

Project emissions

Project emissions are calculated as below:

$$PE_y = PE_{ele, y} + PE_{heat, y} \quad \text{(Equation 5)}$$

Table 9: Project emissions

Parameter	Description	Value	Data Source
$PE_{ele, y}$	Project emissions from the electricity generation in year *y* (t CO_2e/y)	0	--
$PE_{heat, y}$	Project emissions from the heat generation in year *y* (t CO_2e/y)	Calculated	

<Electricity-related project emissions>

As per AMS-I.D., $PE_{ele,y} = 0$.

<Heat generation-related project emissions>

$$PE_{heat,y} = PE_{OFP,jatropha,y} + PET_{oil\text{-}seeds,y} + PET_{biofuel,y} + PET_{wastes,y} \quad \text{(Equation 6)}$$

Table 10: Project emissions from heat generation

Parameter	Description	Value	Data Source
$PE_{OFP,jatropha,y}$	Project emissions from energy use for oil-seed processing of jatropha in year y (t CO_2e/y)		Equation 8
$PET_{oil\text{-}seeds,y}$	Project emissions from the transportation of oil seeds to the processing plant in year *y* (t CO_2e/y)	Calculated	Equation 9
$PET_{biofuel,y}$	Project emissions from the transportation of biofuel to a harbor in year *y* (t CO_2e/y)	Calculated	Equation 10
$PET_{wastes,y}$	Project emissions from the transportation of biomass wastes from the processing plant in year *y* (t CO_2e/y)	Calculated	Equation 11

$$PE_{OFP,jatropha,y} = EC_{OFP,jatorpha,y} \times EF_{CO2,ELEC} + \sum_i (FC_{OFP,j,jatropha,y} \times NCV_j \times EF_{CO2,j}) \quad \text{(Equation 7)}$$

Table 10: Project emissions from oil processing plants

Parameter	Description	Value	Data Source
$EC_{OFP,jatropha,y}$	Electricity consumption in oil processing for jatropha in year y (MWh/year)	Calculated	Preliminary technical evaluation study
$EF_{CO2,ELEC}$	Emission factor for grid electricity supplied to the processing plant using the calculation method of AMS-I.D. (tCO2e/MWh)	0.56053	Ecuadorian DNA
$FC_{OFP,i,jatropha,y}$	Consumption of fossil fuel i at the processing plant for jatropha in year y (tons/year)	0	Not applicable
NCV_i	Net calorific value of fossil fuel i (GJ/ton)	0	Not applicable
$EF_{CO2,i}$	Emissions factor of fossil fuel i in year *y* (t CO_2e/GJ fuel)	0	Not applicable

Since no fossil fuel will be used at the processing plants, Equation 7 is simplified as follows:

$$PE_{OFP,jatropha,y} = EC_{OFP,jatropha,y} \times EF_{CO2,ELEC} \quad \text{(Equation 8)}$$

$$PET_y = FC_{TR,diesel,y} \times NCV_{diesel} \times EF_{diesel,CO2} \quad \text{(Equation 9)}$$

Table 11: Project emissions from transportation

Parameter	Description	Value	Data Source
$FC_{TR,diesel,y}$	Fuel consumption of diesel in trucks for transportation of oil seeds/biofuel/wastes during the year y (mass or volume unit per year)	Calculated	Preliminary technical evaluation study
NCV_{diesel}	Net calorific value of diesel (TJ/ton)	0.043	IPCC (2006) for diesel oil
$EF_{diesel, CO2}$	Emissions factor of diesel in year *y* (t CO_2e/TJ fuel)	74.10	IPCC (2006) for diesel oil

Under the current practice, farmers use animals to carry harvested jatropha fruits to a processing plant in a nearby community. Therefore, $PET_{oil\text{-}seeds,y} = 0$.

The biomass wastes from the processing plants will be formed into a jatropha cake and sold as a fuel in the local community. Therefore, $PET_{wastes,y} = 0$.

Both $PET_{oil\text{-}seeds,y}$ and $PET_{wastes,y}$ will be monitored during the crediting period and will be measured when there are actual project emissions to be considered.

The only project emissions from the transportation is the transport of biofuel from the processing plants to the harbor (La Libertad). According to the current plan, biofuel will be supplied from three processing plants in different communities: Boyaca, Pajan, and Jipijapa. Distance between the three plants and the harbor is as follows:

Table 12: Distance to La Libertad harbor

Processing plants	One-way distance to La Libertad harbor
Boyaca station	140 km
Pajan station	125 km
Jipijapa station	95 km
Average distance	**120 km**

The average distance of the three plants will be used for the ex-ante calculation. However, the exact distanced travelled from each processing plant will be monitored separately.

$FC_{TR,\ diesel,y}$ is estimated based on the assumption that 30 gallons of diesel oil will be used for transporting 10,000 gallons of biofuel for 120 km.

Leakage

AMS-I.C. (version to be decided) takes into account of the following leakage:

- if the energy generating equipment is transferred from another activity
- if collection/processing/transportation of biomass residues is outside the project boundary
- if there is a shift of pre-project activities

- if plant oil is produced in the baseline situation in the area of land where plant oil is cultivated in the project situation

Since new energy generating equipment is purchased for the Project and it is not transferred from another activity, $LE_y = 0$.

The plant oil is produced using jatropha seeds from trees planted around houses and farmlands as hedges. Since Jatropha seeds and fruits are not edible, they are left to be drop naturally and rot on the ground. No plant oil was previously produced using seeds from these trees. Therefore, there is no shift of pre-project activities.

The collection/processing/transportation of the seeds as well as the transportation of biofuel are all within the project boundary.

Therefore, no leakage is to be considered.

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$EF_{y, grid}$
Data unit:	kg CO_2/ kWh
Description:	Grid emission factor at the Island of Santa Cruz
Source of data used:	AMS-I.D., Table I.D.1
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Project involves replacement of electricity in the mini-grid, where only one power station with diesel generators feed in the electricity. The emission factor is for a mini-grid with 24 hour service for over 200kW of capacity.
Any comment:	

Data / Parameter:	NCV_{diesel}
Data unit:	TJ/ton of diesel
Description:	
Source of data used:	AMS-I.D., Table I.D.1
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Project involves replacement of electricity in the mini-grid, where only one power station with diesel generators feed in the electricity. The emission factor is for a mini-grid with 24 hour service for over 200kW of capacity.
Any comment:	

Data / Parameter:	$\eta_{BL, Thermal}$
Data unit:	Dimensionless

Description:	The efficiency of the boiler using fossil fuel that would have been used in the absence of the project activity
Source of data used:	ERGAL
Value applied:	0.80
Justification of the choice of data or description of measurement methods and procedures actually applied :	Boiler nameplate efficiency
Any comment:	Nameplate efficiency is conservative considering that boiler efficiency has declined over its lifetime

Data / Parameter:	$EF_{diesel, CO2}$
Data unit:	tCO_2/TJ
Description:	CO2 emission factor for diesel oil
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	74.10
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is conservative.
Any comment:	

Data / Parameter:	$EF_{CO2, ELEC}$
Data unit:	kg CO_2/ kWh
Description:	Grid emission factor
Source of data used:	Ecuadorian DNA
Value applied:	0.56053
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity used at the oil processing plants will be from the mainland electricity grid, whose emission factor is calculated by the Ecuadorian DNA using 2005-2007 data.
Any comment:	

Data / Parameter:	*Jatropha density*
Data unit:	Gallon/ton
Description:	Jatropha oil density
Source of data used:	ERGAL
Value applied:	286.6
Justification of the choice of data or	Based on the study conducted by ERGAL

description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Since the baseline scenario is expected to gradually increase, the calculation below will take figures from year 1 as an example.

Baseline emission (BE_y)

Year 1

$BE_{ele,y} = EG_y \times EF_{y,grid}$ (Equation 3)

= 7,060 MWh/year x 0.8tCO_2/MWh
= 5,648 tCO_2

$BE_{thermal,CO2,y} = (EG_{thermal,y} / \eta_{BL,Thermal}) * EF_{diesel,CO2}$ (Equation 4)
= (34 TJ/0.80) * 74.10tCO_2/TJ-diesel
= 3,139 tCO_2

$BE_y = BE_{ele,y} + BE_{heat,y}$ (Equation 2)

= 5,648 tCO_2 + 3,139 tCO_2
= 8,787 tCO_2

Project emissions (PEy)

Year 1

$PE_{OFP,jatropha,y} = EC_{OFP,jatropha,y} \times EF_{CO2,ELEC}$ (Equation 8)
= 1,546 MWh x 0.56053 tCO_2/MWh
= 866 tCO_2

$PET_y = FC_{TR,diesel,y} \times NCV_{diesel} \times EF_{diesel,CO2}$ (Equation 9)

=2520 gal-diesel / 286.6 ton/gal-diesel x 0.043 TJ/ton-diesel x 74.10 tCO_2/TJ
=28 tCO_2

$PE_{heat,y} = PE_{OFP,jatropha,y} + PET_{oil-seeds,y} + PET_{biofuel,y} + PET_{wastes,y}$ (Equation 6)
= 868 tCO_2 + 0 +28 tCO_2 + 0

$= 894\ tCO_2$

$PE_y = PE_{ele,\,y} + PE_{heat,\,y}$ (Equation 5)
$= 0 + 894\ tCO_2$
$= 894\ tCO_2$

Leakage

$LE_y = 0$

Emission reduction (ER_y)

$ER_y = BE_y - PE_y - LE_y$

$= 8{,}787\ tCO_2 - 894\ tCO_2 - 0\ tCO_2$
$= 7{,}893\ tCO_2$

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Table 13: Ex-ante estimation of emission reduction

Year	Estimation of project activity emissions (tCO_2)	Estimation of baseline emissions (tCO_2)	Estimation of leakage (tCO_2)	Estimation of overall emission reductions (tCO_2)
2013	8,787	894	0	7,893
2014	10,170	1,035	0	9,135
2015	11,615	1,182	0	10,433
2016	12,959	1,319	0	11,640
2017	14,355	1,461	0	12,894
2018	15,808	1,609	0	14,199
2019	17,317	1,762	0	15,555
Total	91,011	9,262	0	81,749

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**$EG_{y,}$**
Data unit:	kWh/year
Description:	Electricity generated by the cogeneration plant that is supplied to Island of Santa Cruz

Source of data to be used:	ELECGALAPAGOS
Value of data	Calculated using 2013: 7,060,000 2014: 8,171,000 2015: 9,333,000 2016: 10,412,000 2017: 11,534,000 2018: 12,701,000 2019: 13,914,000
Description of measurement methods and procedures to be applied:	Monitored continuously using an electricity meter. Data will be logged by plant personnel on a monthly basis and archived electronically and kept for at least 2 years.
QA/QC procedures to be applied:	The meter will be calibrated by ELECGALAPAGOS according to the national standard.
Any comment:	N/A

Data / Parameter:	**$EG_{thernal, y}$**
Data unit:	TJ/year
Description:	Net quantity of steam supplied by the project activity during the year
Source of data to be used:	ELECGALAPAGOS
Value of data	2013: 34 2014: 39 2015: 45 2016: 50 2017: 55 2018: 61 2019: 67
Description of measurement methods and procedures to be applied:	$EG_{thernal, y}$ will be calculated as follows: $EG_{thernal, y} = Q_{steam} \times h_{steam} \times hr \times 10^{\wedge-6}$ Where: Q_{steam}: Quantity of steam measured at the desalination plant (ton of steam per hour) h_{steam}: Specific steam enthalpy at a specific temperature and pressure (MJ/ton of steam) hr_{steam}: total hours of steam reception at the gate of desalination plant (hours/year) Q_{steam} will be continuously measured at the gate of desalination plant using a

	steam flow meter and archived electronically on hourly basis for at least 2 years. h_{steam} will be calculated based on the monitored temperature and pressure using steam table or other thermodynamic methods.
QA/QC procedures to be applied:	The meter will be calibrated according to the national standard.
Any comment:	N/A

Data / Parameter:	$EC_{OFP,\ jatropha,y}$
Data unit:	MWh/year
Description:	Electricity consumption in oil processing for jatropha in year y
Source of data to be used:	Individual oil processing plants (collected by ERGAL/ELECGALAPAGOS)
Value of data	2013: 1,546 2014: 1,789 2015: 2,043 2016: 2,279 2017: 2,525 2018: 2,781 2019: 3,046
Description of measurement methods and procedures to be applied:	Monitored continuously using an electricity meter. Data will be logged by plant personnel and given to ERGAL/ELECGALAPAGOS on a monthly basis. ERGAL/ELECGALAPAGOS will archive electronically and kept for at least 2 years.
QA/QC procedures to be applied:	The meter will be calibrated at each oil processing plant according to the national standard.
Any comment:	N/A

Data / Parameter:	**$FC_{TR\text{-}oil\text{-}seeds,\ diesel,y}$**
Data unit:	gallon
Description:	Fuel consumption of diesel in trucks for transportation of oil seeds during the year y
Source of data to be used:	ERGAL/ELECGALAPAGOS collected from individual oil processing plant
Value of data	0
Description of measurement methods and procedures to be applied:	The data will be reported by individual processing plant on monthly-basis, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	N/A

Any comment:	N/A

Data / Parameter:	**$FC_{TR\text{-}biofuel,\ diesel,y}$**
Data unit:	gallon
Description:	Fuel consumption of diesel in trucks for transportation of biofuel during the year y
Source of data to be used:	ERGAL/ELECGALAPAGOS collected from individual oil processing plant
Value of data	The data is for the round-trip. 2013: 2,520 2014: 2,940 2015: 3,300 2016: 3,720 2017: 4,080 2018: 4,500 2019: 4,920
Description of measurement methods and procedures to be applied:	The data will be reported by individual processing plant on monthly-basis, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	**$FC_{TR\text{-}wastes,\ diesel,y}$**
Data unit:	gallon
Description:	Fuel consumption of diesel in trucks for transportation of wastes during the year y
Source of data to be used:	ERGAL/ELECGALAPAGOS collected from individual oil processing plant
Value of data	0
Description of measurement methods and procedures to be applied:	The data will be reported by individual processing plant on monthly-basis, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	**$Q_{biofuel,y}$**
Data unit:	Gallon/year
Description:	Jatropha oil consumption at the cogeneration plant during the year y

Source of data to be used:	ELECGALAPAGOS
Value of data	2013: 415,294 2014: 480,647 2015: 549,000 2016: 612,471 2017: 678,471 2018: 747,118 2019: 818,471
Description of measurement methods and procedures to be applied:	The data will be measured by a flow meter at the gate of pipeline to the cogeneration plant, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	Cross-checked against the receipt from the supplier
Any comment:	N/A

Data / Parameter:	$\mathbf{P_{biofuel,i,y}}$
Data unit:	Kg or gallon/fruit or %/fruit
Description:	Amount of jatropha oil produced per fruit per *i* oil processing plant in the year y
Source of data to be used:	Lab analysis from a third party
Value of data	7.5%/fruit
Description of measurement methods and procedures to be applied:	ERGAL/ELECGALAPAGOS collecting samples from individual oil processing plants that supply biofuel to the project site. The lab analysis is conducted once a year, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	$\mathbf{Q_{oil,i,y}}$
Data unit:	Kg or gallon/ton of seed or %/seed
Description:	Amount of oil contained per ton of seed per *i* oil processing plant in the year y
Source of data to be used:	Lab analysis from a third party
Value of data	300kg/ton of seed or 30%/seed
Description of measurement methods and procedures to be applied:	ERGAL/ELECGALAPAGOS collecting samples from individual oil processing plants (i) that supply biofuel to the project site. The lab analysis is conducted once a year, archived electronically, and kept for at least 2 years.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	$NCV_{biofuel, i,y}$
Data unit:	TJ/ton of biofuel
Description:	Net calorific value of biofuel per *i* oil processing plant in the year y
Source of data used:	Lab analysis from a third party
Value applied:	35700
Justification of the choice of data or description of measurement methods and procedures actually applied :	ERGAL/ELECGALAPAGOS collecting samples from individual oil processing plants (i) that supply biofuel to the project site. The lab analysis is conducted once a year, archived electronically, and kept for at least 2 years.
Any comment:	

Data / Parameter:	**Shift of pre-project activity**
Data unit:	--
Description:	Possible occurrence of shift of pre-project activity
Source of data to be used:	ERGAL from individual oil processing plants
Value of data	N/A
Description of measurement methods and procedures to be applied:	Visit individual communities supplying jatropha seeds to the oil processing plant once a year and take a random sampling to check whether the jatropha seeds are harvested from other sources than hedges.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	**Competing use of jatropha seeds**
Data unit:	--
Description:	Possible occurrence of competing use of jatropha seeds
Source of data to be used:	ERGAL from interviewing a government authority
Value of data	N/A
Description of measurement methods and procedures to be applied:	Confirm by interviewing a government authority (e.g. Ministerio de Agricultura, Ganadería Acuacultura y Pesca) to see if there are any arising competing use of jatropha seeds. Monitor once a crediting period.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

Data / Parameter:	**Final waste treatment site$_{i, y}$**
Data unit:	--
Description:	Final waste treatment and/or use and/or disposal site per oil processing plant in

	year y
Source of data to be used:	ERGAL collecting from individual oil processing plant(i)
Value of data	--
Description of measurement methods and procedures to be applied:	This to be monitored and reported when final wastes are not combusted in a controlled manner, disposed in a landfill with biogas recovery, or used for soil application in aerobic conditions in the project activity.
QA/QC procedures to be applied:	N/A
Any comment:	N/A

B.7.2 Description of the monitoring plan:

>>

All monitoring equipment will be installed by experts and regularly calibrated according to the manufacturer's specification by ELECGALAPAGOS at the cogeneration plant.

At the oil processing plant, the parameters are monitored by the oil processing plant owners following training and assistance from ERGAL and ELECGALAPAGOS. Electricity meters are calibrated according to the national standard.

The monitoring team will consist of ERGAL and ELECGALAPAGOS. ELECGALAPAGOS will be in charge of monitoring the data from the cogeneration plant while ERGAL will collect all necessary information related to biofuel production and transportation.

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

>>

The baseline and monitoring study was completed in 05/03/2010 by Mitsubishi UFJ Securities Co., Ltd..

Clean Energy Finance Committee
Mitsubishi UFJ Securities Co., Ltd. (MUS)
2nd Floor, KR Toyosu Building,
5-4-9, Koto-ku, Tokyo, 135-0061, Japan
watanabe-hajime@sc.mufg.jp

MUS is not a project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

01/04/2011

The date when the cogeneration equipment purchase contract will be signed.

C.1.2. Expected operational lifetime of the project activity:

>>

At least 15 years

C.2 Choice of the crediting period and related information:

Renewable crediting period is chosen for the project activity.

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

01/01/2013 or the date of registration whichever is later.

C.2.1.2. Length of the first crediting period:

>>

7 years and 0 month

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
N/A

C.2.2.2. Length:

>>
N/A

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

An Environmental Impact Assessment (EIA) is required for all the energy-related project proposals in the Galapagos, regardless of its size. The EIA for the cogeneration project is under preparation and will start from spring 2010. Ecuadorian law requires public participation meetings to be held during the time in which the EIA study is conducted.

According to a law approved in 2009, the EIA must be approved by at least the Galapagos National Park. However, this being an electricity generation project, the project participant is going to obtain an approval from CONELEC (national electricity regulatory agency) and the Ministry of the Environment.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Although the EIA study has not started for the cogeneration project, another EIA study conducted for the wind and transmission line project on the island of Baltra and Santa Cruz have already identified the following possible environmental impacts that also need to be considered by the cogeneration project.

Table x summarizes these points and individual measures.

Table x: Predicted environmental impact and action to be taken

Predicted environmental impact	Environmental Management Plan
Earth movement and alteration of nests and temporary displacement of reptiles	Prior to excavation for the project site, roads and other infrastructure, the nests and presence of Conolophus subcristatus (Land Iguanas) must be verified. For wind farm construction, access roads needs to install barriers to protect iguanas. The iguanas are a vulnerable species.
Generation of solid and liquid waste	Possible generation of wastes during the construction will be carefully monitored and treated with a co-operation of the National Galapagos Park and other stakeholders of the island of Baltra.
Temporary impacts to tourism due to construction activities	Educational campaigns. ERGAL has hired a local NGO to carry out a wind energy project and energy efficiency education campaign
Species migration	Phyto-sanitary control will be conducted at the port on entry, upon arrival at the Galápagos Islands.

Modification of landscape was not considered, due to the fact that project site is located near the fossil fuel storage station of Baltra.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Stakeholders' meetings will be organized on a number of occasions during the EIA study. Though the project site is located on the Island of Baltra, the direct beneficiaries of the renewable energy generated by the Project are the residents of the Island of Santa Cruz. Therefore, all the community members and business facilities/installations[3] on both islands will be considered as the stakeholders of the Project. In addition, ERGAL will closely consult with all the regulatory authorities related to the project, and those officials will also be invited to the public stakeholders' meetings.

In addition, though it is not part of EIA process, a public hearing will be organized with communities of the Province of Manabi where the jatropha seeds are harvested..

Below is a list of stakeholders that will be invited to the stakeholders' meetings, among others:

- Ministry of the Electricity and the Renewable Energy
- Ministry of the Energy and Mines
- Ministry of the Environment
- Ministry of Agriculture and Livestock
- Ecuadorian military
- National Civil Aviation Directorate
- National Electricity Council (CONELEC)
- Galapagos National Park
- National Glapagos Institute (INGALA)
- Fondo de Solidaridad
- Galapagos Provincial Council
- Santa Cruz Municipality
- Charles Darwin Foundation (NGO)
- PetroComercial
- Community members of Baltra and Santa Cruz
- Community members of the Province of Manabi where Jatropha seeds will be collected

E.2. Summary of the comments received:

>>

Preliminary interviews with individual entities mentioned in the previous section all gave positive responses. The relevant entities found the project very well designed that not only it serves the needs for clean energy in the Galapagos, but also serves as a source of additional revenue in the impoverished communities in rural areas of the mainland from the wasted resources (jatropha seeds). The fact that the

[3] These regulatory bodies include Ministry of the Electricity and the Renewable Energy, Ministry of the Energy and Mines, Ministry of the Environment, the National Electricity Council (CONELEC), Galapagos National Park, National Glapagos Institute, Fondo de Solidaridad, Galapagos Provincial Council, and Santa Cruz Municipality.

project does not require a new plantation which may cause a significant impact on the environment was another point that was well received by the stakeholders.

Nevertheless, community members ,especially from the Galapagos, may be unaware of what the Project might entail, and it is highly possible that many questions will be raised at the beginning. The pilot project using jatropha oil for a small power generation in Floreana island has already conducted some stakeholders' meetings and the questions raised during the meetings were concentrated on biofuel production and monoculturalistic activity.

E.3. Report on how due account was taken of any comments received:

>>

Table x summarizes the responses given to the concerns raised during the stakeholders' meeting.

Table x: Potential concerns that may be raised during the stakeholders' meetings and their answers

Potential concerns that may be raised by the stakeholders	Possible answers by the project developer
Possible encouragement of promoting the cultivation of Jatropha in the Galapagos	It is forbidden by the National Environmental Law and the Galapagos management plan. Jatropha will be produced only in the mainland.
Concern for possible development of monoculture forest cultivate practices in the mainland to supply the biofuel to the Galapagos	Jatropha availability from hedges from the Province of Manabi is sufficient to supply energy needs from the Galapagos. In addition, the Ministry of Environment is working closely to promote good environmental practices.
Land utilization to biofuel production rather than food	This project does not foster plantation practice. On the contrary, it will make a good use of jatropha available on existing hedges.
Possible increase in air pollutants by using biofuels	The technology used in the cogeneration will be equipped with a scrubber to treat the air pollutants in the exhaust gas before released to the air.

In conclusion, the proposed project may raise many questions from the stakeholders due to being a first-of-its-kind in Ecuador. However, there are no significant negative comments that could be considered for this proposed CDM project activity.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Energías Renovables para Galápagos (ERGAL) (designated organization by Fideicomiso Mercantil Energía Renovable para Galápagos)
Street/P.O.Box:	Finlandia 192 y Suecia 17 17 184
Building:	Scandinavian Loft
City:	Quito
State/Region:	Pichincha
Postfix/ZIP:	
Country:	Ecuador
Telephone:	(593) 2 33 31 279
FAX:	(593) 2 60 02 731
E-Mail:	info@ergal.org
URL:	
Represented by:	Leonardo Zaragocín
Title:	Project Coordinator
Salutation:	Dr.
Last Name:	Zaragocín
Middle Name:	Vicente
First Name:	Leonardo
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	leonardo.zaragoci@gmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Official Development Assistance (ODA) from parties included in Annex I of the convention is involved in the project activity.

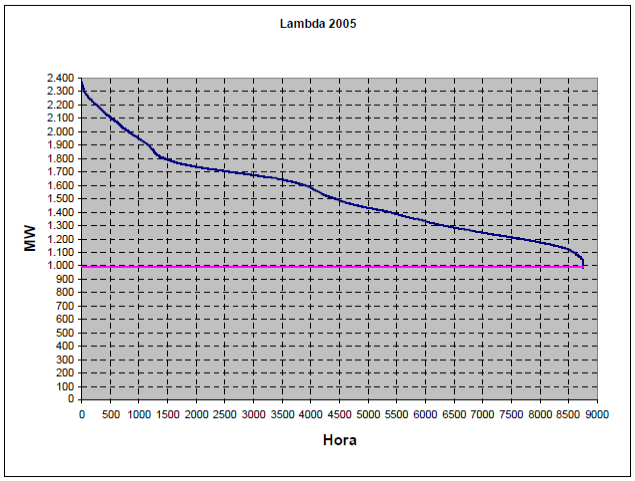
Annex 3

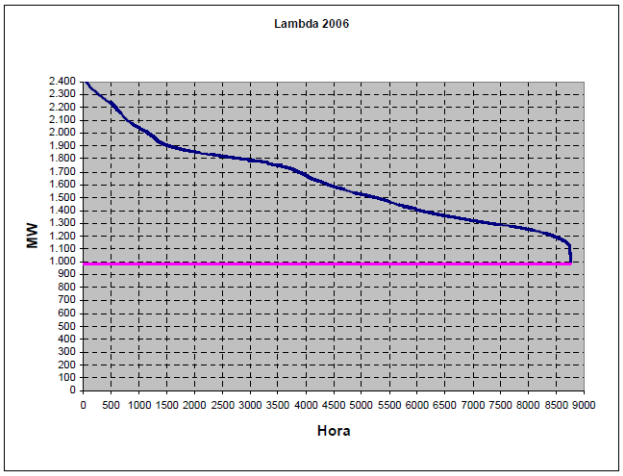
BASELINE INFORMATION

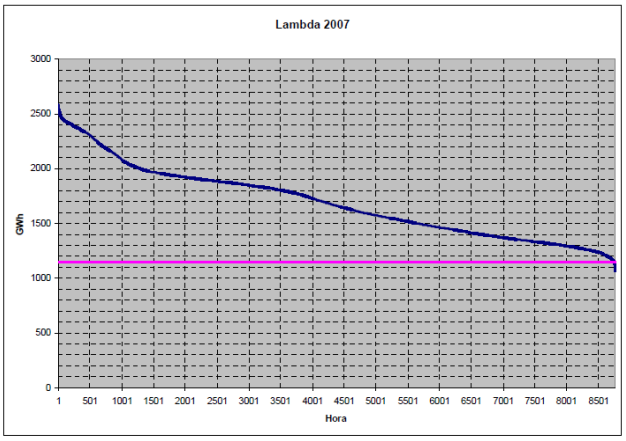
Grid emission calculation for the mainland Ecuador published by the Ecuadorian DNA

Methodology used: ACM0002, ver. 07
Method: Simple adjusted OM

Ecuadorian OM:







OM from 2005 to 2007: 0.73188 tCO_2/MWh

BM from the 20% of the most recently added system generation: 0.38918 tCO2/MWh

$EF_y = W_{OM} \times EF_{OMy} + W_{BM} * EF_{BMy}$

Where:
$W_{OM} = W_{BM} = 0.5$

EFy = 0.73188 tCO_2/MWh * 0.5 + 0.38918 tCO_2/MWh
= 0.56053 tCO_2/MWh

Annex 4

MONITORING INFORMATION

As per section B.7.2.

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